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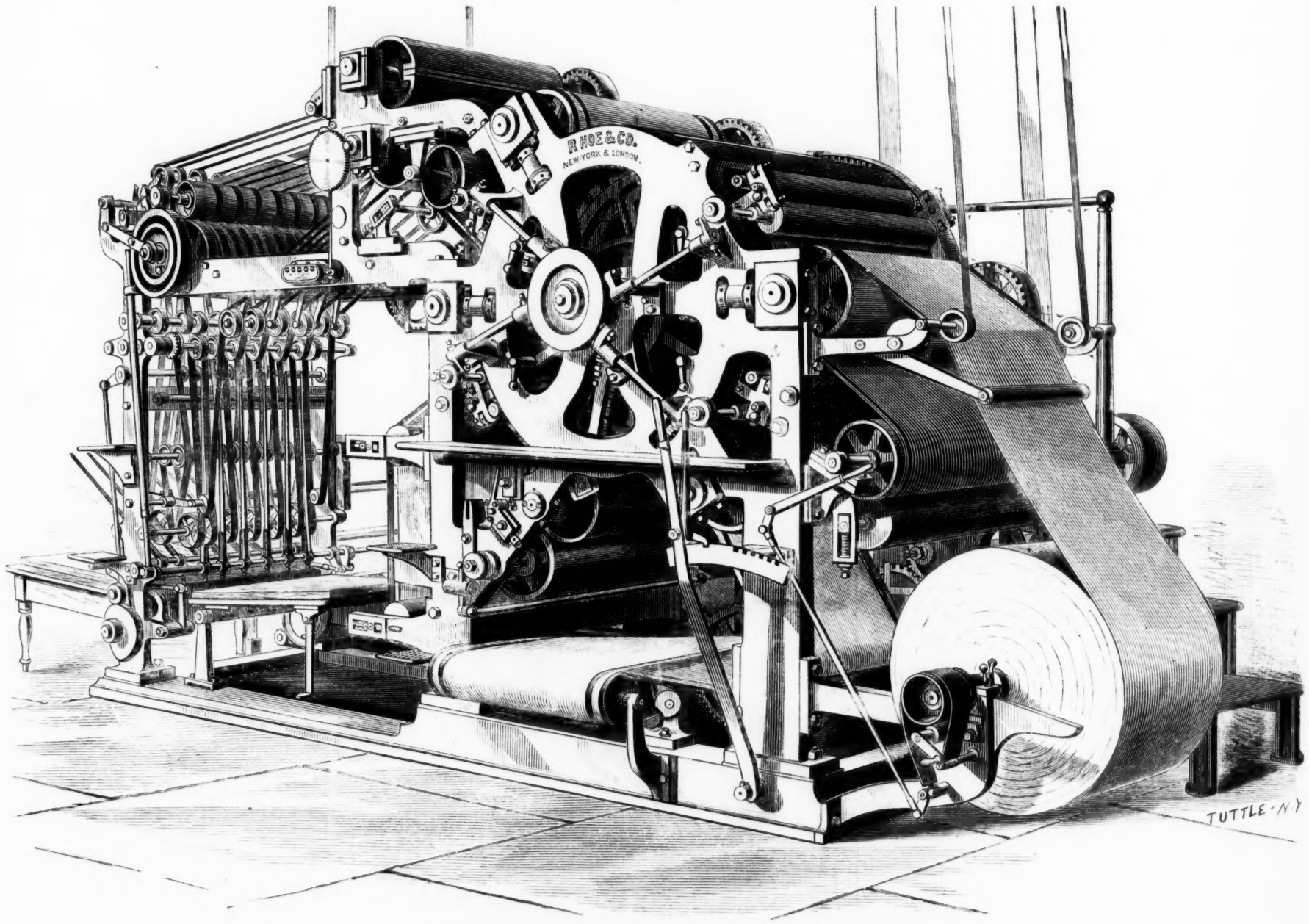


HOE'S NEW CONTINUOUS SHEET NEWSPAPER PRINTING PRESS.

Hoe's New Continuous Sheet Printing Press.

The engraving upon this page shows the latest and most improved form of Hoe's rapid newspaper printing press, using a single continuous sheet of paper. This machine was built for *The Critic*, Washington, D. C., and is the second one ever built embodying the same principles of construction. It is what is termed a "type revolving, endless sheet printing press." The general construction and appearance very much resembles the usual form of a revolving cylinder press. Instead, however, of printing from a cast metal stereotyped form, the impressions are taken directly from the type which is held in "turtles," or curved forms attached to the surface of the cylinder. In using the ordinary style of revolving cylinder press, the type is set up in the composing room and locked in forms upon a flat stone or surface plate. A mould is then made and a cast metal form produced to fit the curved surface of the cylinder. The process of stereotyping usually occupies twenty minutes or more, which, at times, is quite a disadvantage in publishing an afternoon daily paper. The arrangement of the press here shown dispenses with the delay, trouble and expense of stereotyping, in the following manner: The turtles or curved forms (for which there are places for two upon opposite sides of the cylinder) are sent to the composing room. They are called turtles from their resemblance to a turtle's back. The rules between the columns are always left in the turtles. The type is set up, corrected, then placed in the form and locked by wedges and strips operated by set screws.

The turtles are then lowered through a chute to the press-room, where they are quickly hoisted to their places upon the cylinder of the press. An iron clamp is placed through a screw eye in the middle of the turtle with one end resting upon the frame of the cylinder, then by tightening a set screw upon the other end the form is expeditiously and securely held upon the cylinder. The two turtles placed upon opposite sides of the cylinder are used for printing opposite sides of the paper. The roll of paper (previously dampened)is placed at the end of the machine, as shown; thence it passes between the impression roll and the revolving cylinder, where the first impression is given which prints one side. It then passes down and around two solid bars and a roller, placed exactly at right angles to each other near the bottom of the press directly under the cylinder. This is a very ingenious device, and turns the continuous sheet over so that as it passes up the other side of the cylinder a second impression is given, which prints the remaining side of the paper. It will be seen that the adjustments must be very neatly made, in order that the second impression may come exactly opposite the first.

After the second impression is made the printing is completed, and in passing between the cutting rolls, located at the extreme top of the machine, each paper at every revolution of the cutting rolls, is cut from the web. The sheets then enter a series of tapes which conduct them to the collecting cylinders. One of the rolls caries this first sheet around with it, and at the next revolution a second sheet is received upon the first one.

This pair of sheets, which we will suppose to be the two having their outside pages uppermost, are, by means of a device called a switch, directed off from the collecting cylinders to a set of tapes which conduct them to a sheet-flier and thence upon a table. The next two sheets, which have their inside pages uppermost, are now collected upon the other roll of the collecting cylinders and directed to a second sheet-flier, and thence are delivered with their outside pages uppermost upon a second table. Thus the newspapers after being printed are piled with their outside pages uppermost upon two tables, placed at each side of the sheet-flier, as shown in the engraving.

To prevent the web sheet from slipping it is assisted by propellers or belts, and is held to the type roller by rubber-faced wheels. The turtles upon the cylinder occupy only about half its circumference, which allows the space between the forms to be used as an ink-distributing surface. The ink is received from a receptacle and distributed by rollers in the usual way. Two sets of inking rolls are used, one for each form.

The impression rolls are placed in proper positions at the sides of the type cylinder and are faced with felt. This press will run from 12,000 to 15,000 papers an hour.

Details of High Speed Automatic Rolling Mill Engine.

We present this week some of the details of the rolling-mill engine illustrated in our issue of Jan. 28. Of these, Fig. 1 is a vertical section of the cylinder through the valve face, also showing the valve in section. Referring to this cut, it will be seen that the lower steam passage enters the cylinder its full depth below the inside bottom, and that the whole inside bottom surface of the cylinder slopes or inclines towards the entrance of this passage. The object of this is to overcome the difficulty experienced from the accumulation of water in the cylinder, which, in the vertical engine, is usually a source of considerable annoyance and frequently the cause of serious accidents.

In this cylinder any water that may be present in the bottom finds its way by gravity to the port entrance, and is forced out by

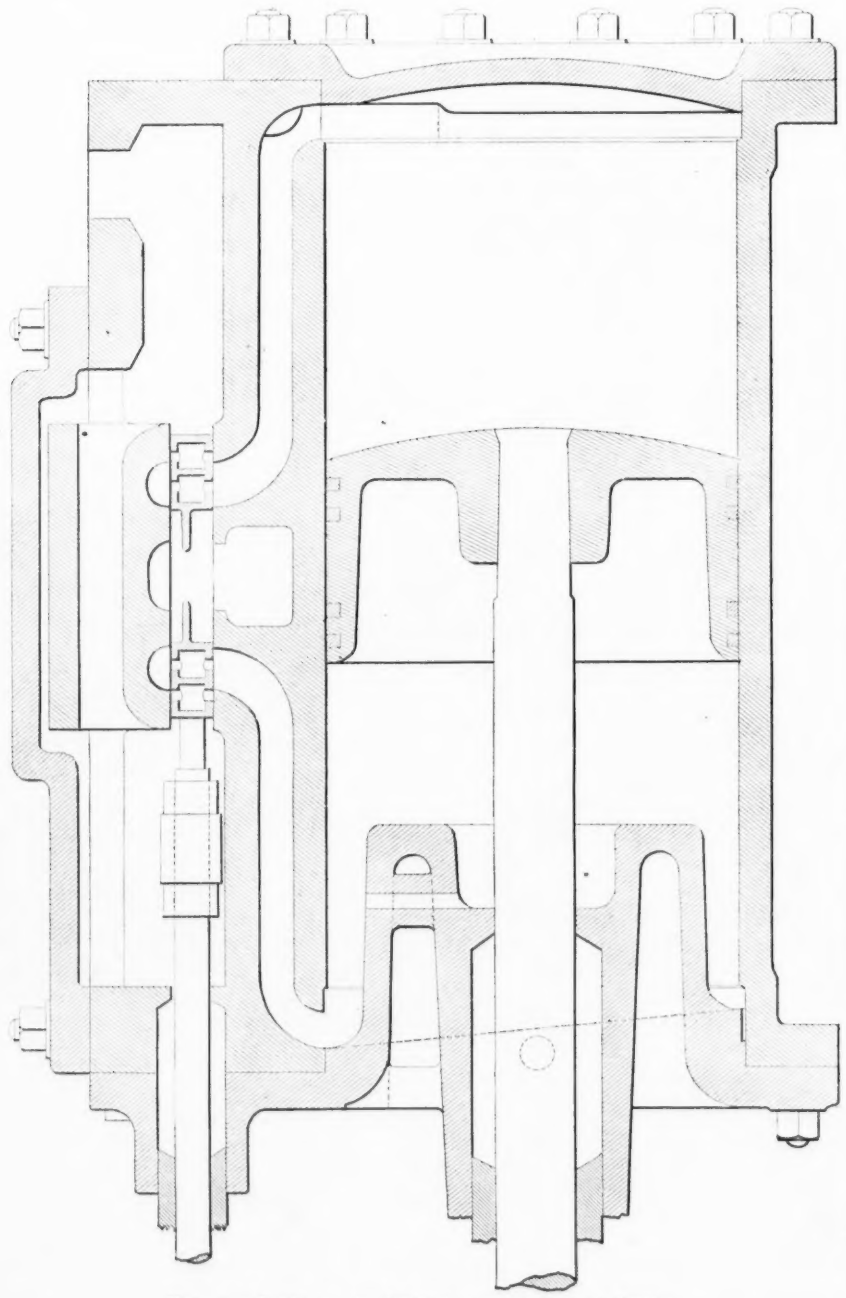


FIG. 1.—SECTION OF CYLINDER AND STEAM CHEST.

and with the exhaust steam at or before the commencement of the return stroke.

To assist in the escape of water from the top of the cylinder, the piston is made quite crowning at that end, the effect of which is to collect the water in a narrow band, instead of spreading it over a large surface. This materially assists in its escape, and at the same time presents a large surface for the distribution of any water that may not find its way out in advance of the piston.

The piston is a single casting unusually long and light, and is packed with four spring rings of $\frac{3}{8}$ inch square brass wire.

The valve is a simple rectangular plate, working between the valve face and a cover plate, the cover plate being held in its proper position, relative to the back of the valve, by steam pressure against its outer surface, and by resting against loose distance pieces between its inner surface and the valve seat. This construction admits of the valve leaving the seat, if necessary, to relieve the cylinder from water, as in the instance of priming, and also, by the reduction of these pieces, admits of ready adjustment to contact, should it become necessary.

The cover plate is provided with recesses on its inner surface which exactly correspond with the ports in the valve face, and the corresponding ports and recesses are kept in communication with each other by means of relief passages in the valve. From this it will be seen that the valve is subjected to equal and balanced pressure on each of its sides, and hence, is in exact equilibrium.

The valve is operated through the valve motion, shown in Fig. 2, the eccentric rod of which hooks on a slightly tapered block that turns on the pin of the rock arm, like an ordinary journal box.

The expansion, or cut-off, is automatically regulated by the operation of the governor in swinging the slotted eccentric in a manner substantially equivalent to moving it across the shaft, but is however favorably modified by the arrangement of the rock arm, which in combination with the other motions neutralizes the unfavorable operation of the usual shifting eccentric, and which, in connection with the large double port opening, provides for a good use of steam from 0 to $\frac{3}{4}$ stroke.

The governor (see Fig. 3) is of the disc and single ball type, the centrifugal force of the ball being counteracted by a powerful spring. Friction is reduced to a minimum in the governor connection, by introducing steel rollers and hardened steel plates in such a manner as to provide rolling instead of sliding motion.

In order that a governor shall correctly perform its functions, it is unquestionably necessary that it have power largely in excess of the work required of it, and also that the friction shall represent a very low percentage of that power. In respect to this, as intimated, especial means have been employed to reduce the friction; the valve being balanced requires but little power to move it, while the governor ball being made heavy for the purpose of counterbalancing the weight of the eccentric and strap, its centrifugal force when the engine is at full speed is enormous, the spring to counteract it having to sustain from *two to three thousand pounds*. Under these circumstances, as might be expected, the regulation is remarkably good. This is a very important consideration in an engine working under the conditions of a roll-train engine.

Fig. 4 represents a section of the pillow block box, crank pin and wheel, together with the main journal. It will be seen that the end of the box next the crank wheel has a circular groove around its outside, and that a corresponding groove in the crank wheel projects over this groove. From this latter groove an oil hole of liberal size extends, as shown, to the surface of the crank pin. Any oil placed at the upper part of the groove on the box finds its way by gravity into the groove in the crank wheel, and is carried by centrifugal force to the outside surface of the crank pin; so that whatever other means of lubrication may be employed, this one will always be positive in its action. This cut also shows the manner in which the box overlaps the main journal and forms the oil reservoir.

Another feature in the construction of this box is the means by which it is made to adjust itself in line with the shaft. It will be observed that it rests on the bottom of the jaws of the frame on two inclined surfaces, which form equal angles with the axis of the shaft when in its normal position, and that by moving longitudinally in either direction, as may be necessary, the box will accommodate itself to a change in the alignment of the shaft. In order that it may be free to move for this purpose it is not fitted with the usual fore and aft flanges. By this means any slight derangement, as in either the outboard or inboard bearing wearing down the fastest is taken care of, the movement of the box on the inclined surfaces being for this purpose equivalent to the operation of a ball and socket bearing.

Fig. 5 shows the construction of the connecting rod and cross head, which is sufficiently plain without further description.

We are not in possession of indicator diagrams from this engine, but as illustrative of the subject, in Figs. 6 and 7 we present two diagrams taken by the writer from a horizontal engine built by the Straight Line Engine Company, and which is fitted with precisely the same valve gear as this one, with the exception of such modifications as are required to adapt it to a horizontal engine. The cylinder of this engine was 8″x14″ and the speed 205 revolutions per minute. The engine was doing regular duty at the time the diagrams were taken.

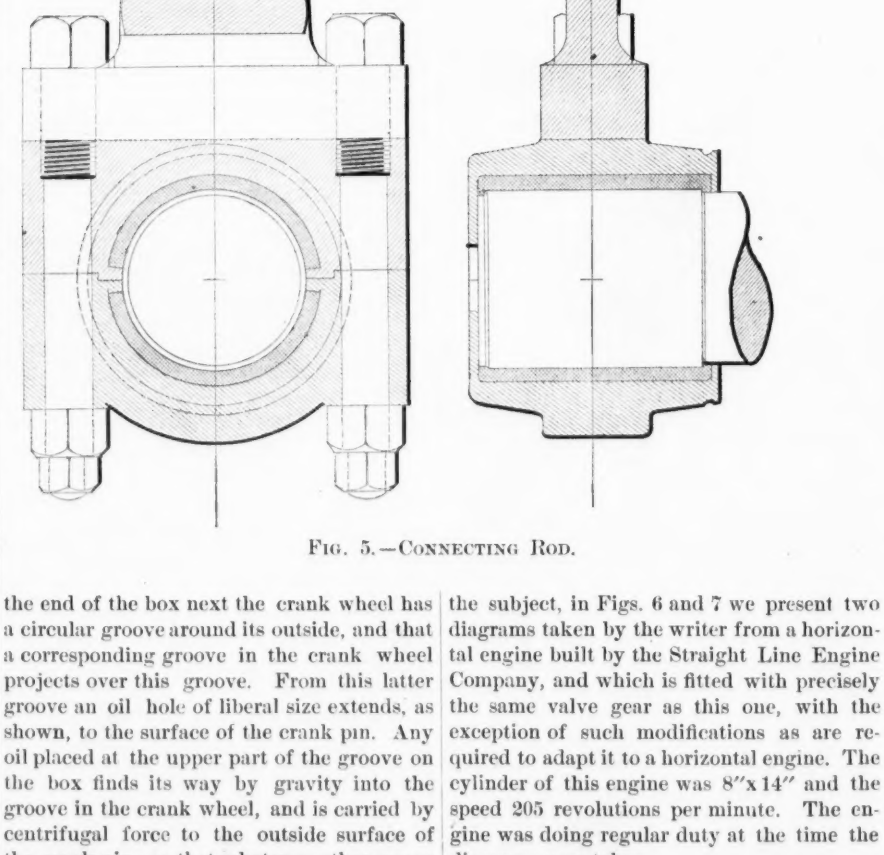


FIG. 5.—CONNECTING ROD.

The principal dimensions of details are:

Cylinder	12″x20″
Crank Shaft Journals, diameter	$7\frac{1}{2}$″
Body of Shaft, diameter	7″
Crank Shaft Journals, length	12″
Cross Head pin, diameter	$3\frac{1}{2}$″
" " " length	5″
Crank pin, diameter	$4\frac{1}{2}$″
" " length	5″
Piston rod, diameter	$2\frac{5}{16}$″
Valve rod, diameter	1″

Prof. Jenkin on the Apprentice Question.

We condense from *Engineering* some salient points in the address of Prof. Fleming Jenkin, on the apprenticeship question, recently delivered at the University of Edinburg, in the belief that they are worth the consideration of manufacturers and others in this country. The professor said:

What he wished to talk about was that the real education of a workman could be given nowhere except in a workshop, as men could only learn their trade by working at it. At present a lad who went to learn a trade, picked up what knowledge he got of it the best way he could. There was no organization by which he could become a proficient workman. He (Professor Jenkin) would select every lad for the trade he wished to enter with as much care as was exerted in regard to one who wished to enter a profession. The lads should pass an educational test, and below a certain standard, they should not be allowed to enter. After they were admitted there should be a regular course of instruction in the workshop. There should be a skilled workman in every room to whom the apprentice could apply as a matter of right. There would have to be settled a course of instruction through which the apprentice should pass, and that would imply the classification of jobs. The apprentice should then pass from one grade to the next higher by merit, and if he made no progress at the beginning to qualify him for promotion, let him be dismissed. That would result in each lad getting a definite course of instruction. Conjoined with that plan, the professor said he would have scientific training outside the workshop, but he would not make this feature compulsory on apprentices. His impression was that the indenture system was dead, although to break it was a serious matter. He would not like to see an apprentice bound rigidly to stop at a shop where he commenced, until his time was out. He suggested as a rule that if an apprentice left one shop he should be put back one step on entering another, making it in this way for his interest to remain a definite time.

In reply to the discussion which followed, Prof. Jenkin said that after hearing the opinion of such bodies as that which he addressed, and the employers, if a fair amount of support was given to the general principles suggested, a short document would be prepared embodying them. Bodies of workmen and employers might then be asked to adhere to the principles, and form themselves into an association for the purpose of carrying out the scheme.

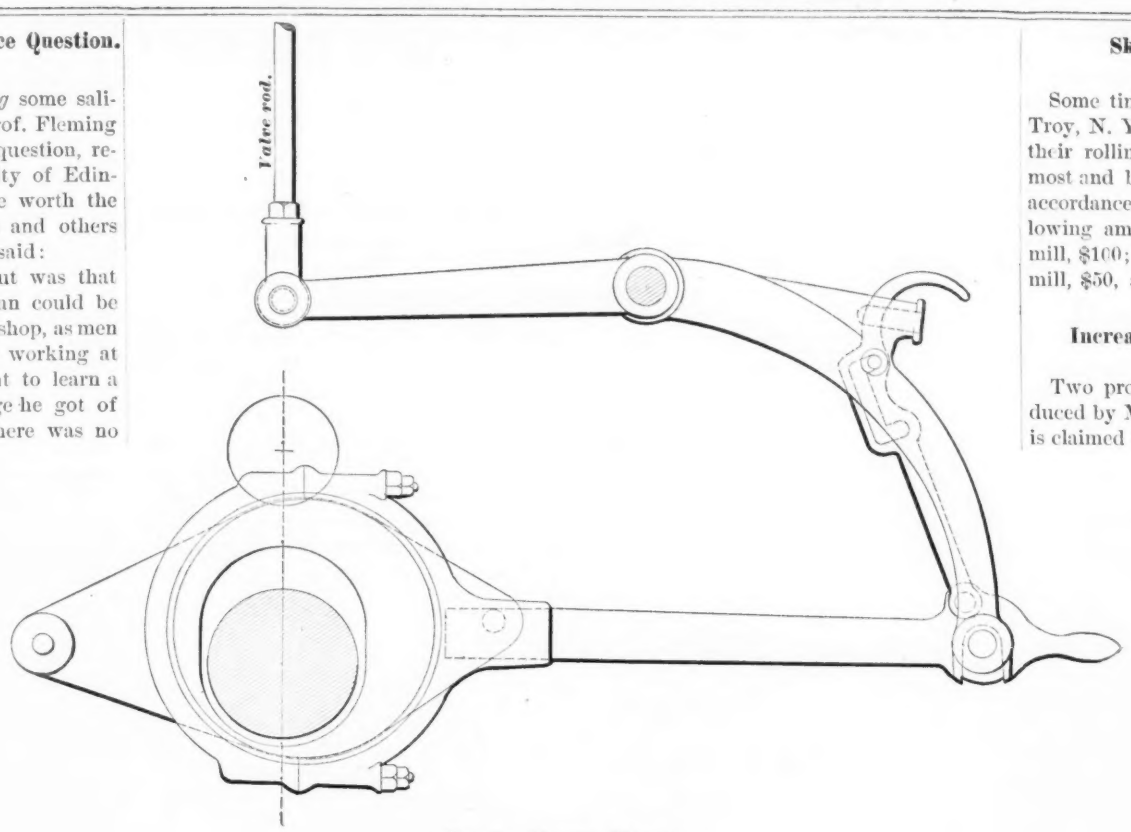


FIG. 2.—VALVE MOTION.

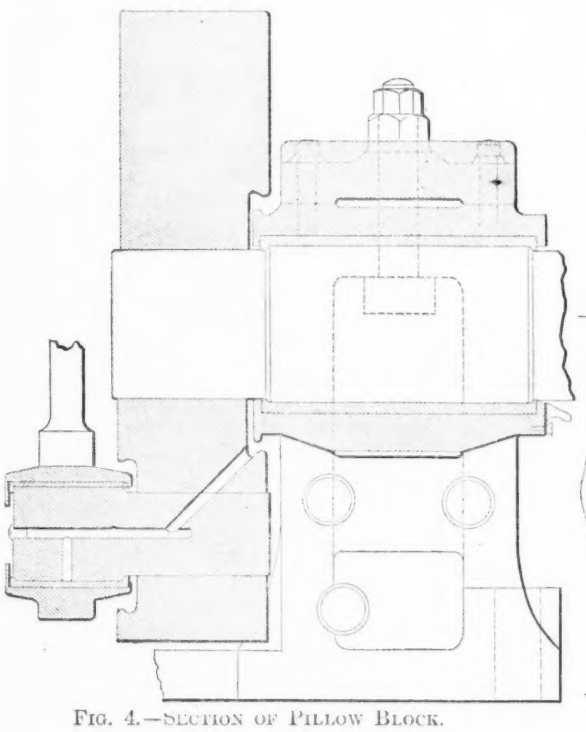
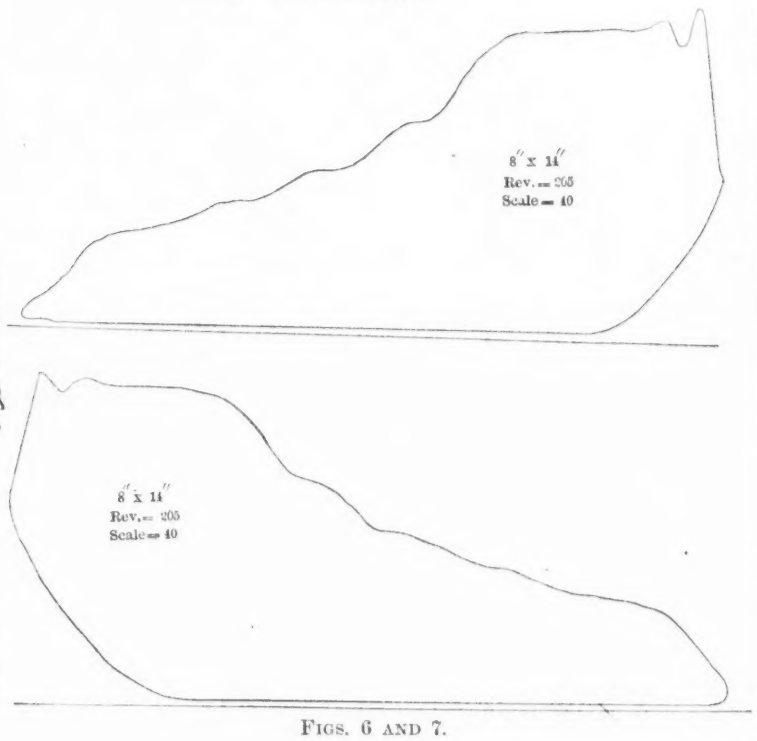


FIG. 4.—SECTION OF PILLOW BLOCK.



FIGS. 6 AND 7.

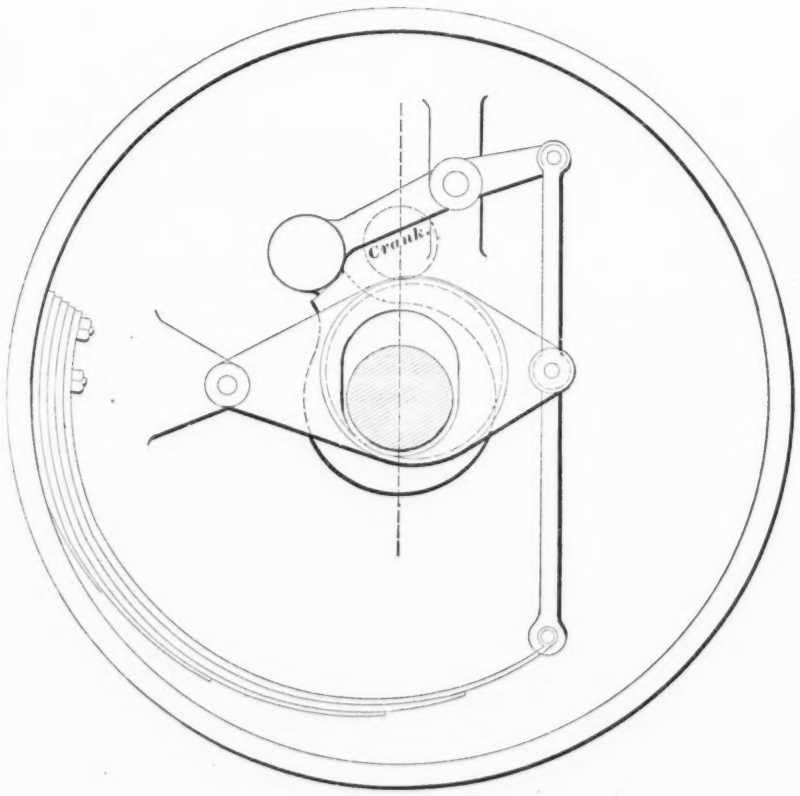


FIG. 3 —GOVERNOR.

A company with half a million dollars capital has been organized in Rochester, N. Y., to build cars.

It is said that ninety per cent. of the cost of producing a steel rail is labor.—*Industrial World.*

Skilled Labor Rewarded.

Some time ago the Burden Iron Works, Troy, N. Y., offered prizes to the men in their rolling mills, who should turn out the most and best work in a specified time. In accordance with that offer prizes of the following amounts have been awarded: Steam mill, $100; $75; $50; $30; and $25. Water mill, $50, and $30.

Increasing the Strength of Iron.

Two processes have been recently introduced by M. Seguin, of Paris, by which it is claimed that the resistance of iron to the various strains to which it is subjected is considerably increased. In one process the piece of iron is raised to a cherry red heat, and dipped in a mixture of sulphuric acid and water. In the other process the piece is similarly heated and quenched in a mixture of one part of turpentine and six parts water.

A German chemist, it is said, has discovered a way of solidifying petroleum for shipment, so it can be liquefied again at will.

Fireless Locomotives.

Some years since technical journals in this country had considerable to say in reference to fireless locomotives; that is, locomotives, the boilers of which were supplied at intervals with water of a high temperature, and which made their trips by the use of steam generated by the heat contained in this water. Trials of these locomotives were made at New Orleans, but we believe they were not particularly successful. We learn, however, that a Paris surburban railway line has been using similar motors for the past three or four years with gratifying success.

Last year was the most prosperous one on record for shipbuilding on the Clyde. The amount of tonnage launched by the various firms on the river is largely in excess of any previous year. Altogether some 261 vessels, having an aggregate summation of 341,022 tons, were put into the water.

Technical Schools.

Some idea of the interest in the technicalities of the various industries may be gathered from the fact that Austria alone supports 1,000 technical schools, Italy between 300 and 400, Bavaria 1,600 for girls, Holland 32, Germany a large number, and so on with other European countries.

Col. Sam. Webber tells a story about returning home from making a test of machinery in a country town where a circus had just exhibited. He had his instruments securely fixed for transportation and one box marked: "Dynamometer. Handle with care." The baggage smashers at the railroad station were afraid to handle the box, believing it to contain some dangerous animal that might get out and seize upon them. It was only by extra persuasion that anybody could be prevailed upon to load the box upon the train.

INSTANTANEOUS FORMATION OF STEAM—Serpollet Frères & Co., of Paris, says the *Mechanical World*, have patented an invention for the instantaneous formation of steam, which permits of its use at once in the cylinder of the engine. A pump sends the required quantity of liquid between two plate surfaces, which are heated, and between which there is only a capillary space. The liquid spreading in a thin layer evaporates at once, without going into the so-called spheroidal state, and this steam acts in the cylinder as fresh-formed steam. The speed of the pump is regulated by the engine, the pump being connected with the shaft of the engine.

How to Proportion Slide Valves.

BY HUGO BILGRAM, M. E.

To facilitate the proper proportioning of slide valves, and to show the effects of the laps and leads of the valve, and the angular advance of the eccentrics, quite a number of methods have been proposed and used, one of which is shown below. In order to avoid misunderstandings, it is proper to preface the rule by definitions.

When a well-proportioned slide-valve is in its *neutral* position (when the eccentric is at right angles) the valve face overlaps the steam ports. The overlapping on the steamside of either port, is the *steam lap* of the valve for that particular port; the overlapping on the exhaust side is the *exhaust lap*. The exhaust lap is frequently made equal *O*, or in some cases even negative, *i. e.*, when the valve is in its neutral position the ports are more or less opened for exhaust. The laps are not necessarily equal for both ports; on the contrary, for some reasons, a small difference in the laps for either port is of advantage. *Lead* is the linear width of the opening of the ports for steam or exhaust when the crank is on its center, and the *angle of advance*, or *angular advance*, is the angle by which the eccentric is ahead of its right angular position when the crank is on its center. This angle is sometimes called the *angle of lap and lead*, for obvious reasons.

The effect or operation of a given slide valve on one of its two ports can be represented by the diagram, Fig. 1, as follows:

Draw the circle *Z* with a diameter equal to the travel of the valve, and the line *Q*, Q^1, forming an angle equal to the angular advance with the horizontal diameter of the circle *Z*.

With *Q* and Q^1 as centers, draw the circles *L*, L^1, *l* and l^1, with radii respectively equal to the steam and exhaust laps of the valve, relative to the port under consideration. Imagine the center *O*, of the circle *Z*, to be the center of the main shaft of an engine, (which in this case is assumed to be of the horizontal type) the crank rotating in the direction indicated by the arrow. The diagram is then to be interpreted or read as follows:

Steam is admitted while the crank moves from *A* to *E*, between the circles L^1, and *L*, and is exhausted while the crank moves from *R* to *C*. *A* is the position of the crank when the steam is first admitted. At *E* expansion begins. *R* is the point when the opening for exhaust is effected, and *C* represents the moment when compression begins.

The theoretical indicator diagram taken from the corresponding side of the cylinder, (assuming no throttling) would appear as indicated below the valve diagram, provided no account is taken of the angularity of the connecting rod. The diagram further shows this: When the crank is in any position, say in K^1, the corresponding linear opening of the port can be found by dropping from *Q* or Q^1, on the line $O\,K^1$, a perpendicular line $Q\,k$, or Q^1, k^1. That portion of either of these lines defined by the line of the crank, and the circumference of the lap circle represents the opening of the port. Thus, for the position of the crank $O\,K^1$, the port opening for admission is represented by the length $a^1\,k^1$; for the position $O\,K''$ the port opening for exhaust by the length, $b\,k$

Thus, when the crank is on its center, the port opening is equal to the shortest vertical distance of the circle *L* from the line $O\,K$. This distance, therefore, represents the lead of the valve. When the crank has a position, *N*, at right angles to the line $Q\,Q^1$, the opening of the port is represented by the line Oc or Oc^1, which is the greatest port opening attainable by this valve.

Thus, when a valve of known dimensions is to be examined, the diagram at once reveals the point of admission, of cut off, of release and of cushioning, the lead, the greatest port opening, the port opening for any position of the crank, and, in short, gives answers to every pertinent question.

The greatest advantage of this diagram is, however, that its application can be inverted. Suppose a valve having a known travel, say 4 inches, is to cut off at a given point, say $\frac{3}{8}$ of the stroke, to have a certain linear lead, say $\frac{1}{4}$ inch, and to cushion the steam for the last $\frac{1}{8}$ of the stroke—

Question: How much lap should be given to the valve on the steam as well as on the exhaust side, or what will be the angular advance of the eccentric? etc., etc.

Solution: Draw the diagram from the dimensions given and shown in Fig. 2, as follows: Draw the circle *Z*, diameter, 4 inches, the line *O E* for cut off, corresponding with $\frac{3}{8}$ of the stroke and the line *O C* for cushioning, representing $\frac{8}{8}$ of the stroke. Draw the line *h h*, $\frac{1}{4}$ inch above the horizontal center line, representing the lead. It is, then, not difficult to draw the circle *L*, as its center *Q* must be in the circle line *Z*, and it must touch both the line *h h* and the line *O E*. Its radius is the required lap. Then find Q^1, diametrically opposite *Q*, and draw the circle l^1 to touch the line *O C*. The radius of this

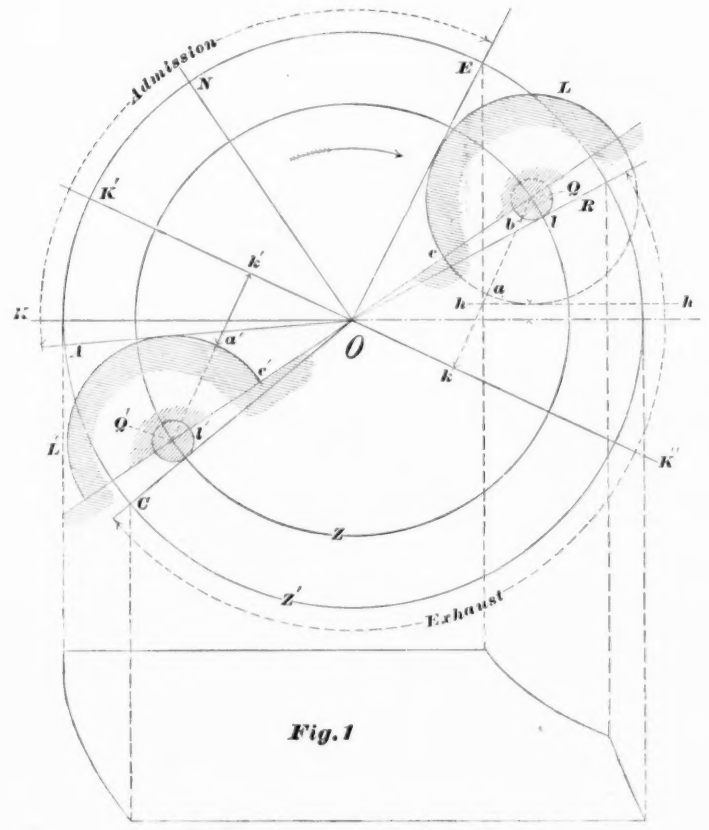


Fig. 1

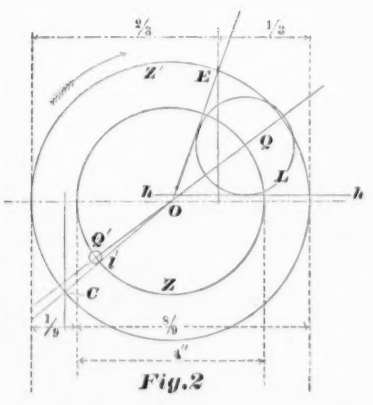


Fig. 2

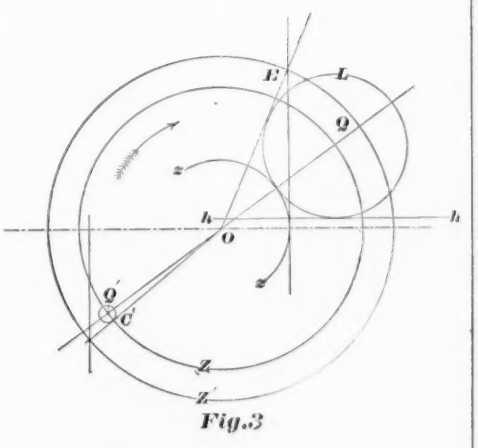


Fig. 3

circle is the required inside lap. The horizontal inclination of $Q\ Q^1$ represents the angular advance of the eccentric, and other questions can be answered as before in Fig. 1.

Or, say a valve is to be designed to cut off at $\frac{7}{10}$ with a lead $\frac{1}{8}$ inch, to have a greatest port opening of $\frac{3}{4}$ inch, and to cushion for $\frac{1}{5}$ of the stroke. How much travel must the valve have? etc. All questions can be answered if it is possible to draw the diagram from the given dimensions. To accomplish this, draw (see Fig. 3) the lines *O E* and *O C* representing the crank for the given moments of cutting off and compression, draw the line *h h* $\frac{1}{8}$ inch (the lead) above the horizontal center line, and the circle *z z*, with a radius equal to the greatest port opening $\frac{3}{4}$ inch. The whole difficulty is now reduced to the simple problem of drawing a circle *L*, that will at the same time touch the lines *h h*, *O E*, and the circle *z z*. From *O* as a center, the circle *Z* may be drawn through *Q*, the center of that circle *L*, and the diagram completed by drawing the exhaust lap circle as before (in Fig. 2).

The application of this diagram is so simple that it deserves to be more generally known and applied.

Locomotive Engine Running—Watching the Exhaust.

What the beating pulse is as an aid to the physician in diagnosing diseases, the sound of the exhaust is to the engineer as a means of enabling him to distinguish between perfective and defective working of the locomotive. The ability to detect a slight derangement by the sound of the exhaust, can only be acquired by practice in watching those steam notes day after day as they play their tune of labor through the smoke stack. When the steam ports are even and the valves correctly set, with tight piston packing and valves free from leaks, the notes of the exhaust will sound forth in regular succession in sharp, ringing, clear tones, every puff seeming to cut the steam clean off at the top of the stack. There is a long array of defects represented in the journey from this case of apparently perfect steam performance, to that where the exhaust steam escapes as an unbroken roar mixed with uncertain wheezy coughs.

The deterioration of piston packing, and the rounding of valve seats which produce an asthmatic exhaust, may be followed in their downward course, if the engineer gets into the habit of listening to the exhaust and marking its changes. It is very important that he should do so. For if he hears the sound of decay understandingly, he can have a remedy applied before the evil becomes serious. The man whose ear from long practice has become sensitive to a false tone of the exhaust, does not need to make experiments by applying steam to the engine while it stands in various positions, in order to find out where a blow comes from, whether it is in the pistons or in the valves. Leaning out of the cab window, he watches the crank as it revolves and compares the noise made by the blowing steam with the crank position. Pulling on a heavy grade is an excellent time for noting imperfections in the working of valves and pistons, for the movements are comparatively slow, while the pressure of steam on the working parts is so heavy that any leak sounds prominently forth. The observing engineer perceives that the four sounds of the exhaust, due to each revolution of the drivers, occur a few inches before the crank reaches, first the forward centre, second the bottom quarter, third the back centre, fourth the top quarter.

The first and third position exhausts emit the steam from the front and back strokes of the right hand piston; the second and fourth exhausts are due from discharges of the steam that has been propelling the left hand piston. With these facts impressed upon his mind, he will understand that if an intermittent blow occurs during the periods the crank is traveling from the forward center to the bottom quarter, or from the back center to the top quarter, the chances will be that the right hand piston wants to be examined. For the greatest pressure of steam follows the piston just after the beginning of each stroke and that is the time a blow will assert itself. Should the blow occur while the right hand crank is moving from the bottom quarter to the back center or from the top quarter to the forward center, it will indicate that the left hand piston is at fault. For at these periods the left cylinder is receiving its greatest pressure of steam.

It is generally understood that an intermittant or recurring blow belongs to the pistons and that a constant blow comes from the valves. But sometimes the valves blow intermittently, being tight at certain points of the travel and leaky at other points. To distinguish between the character of these blows is sometimes a little difficult except to the thoroughly practiced ear. The sound of the blow can be heard best when the door is open, and the novice should not fail to listen for it under that condition. The valve blow is a sort of wheeze with the suggestion of a whistle in it; the piston makes a clean, honest blow which would break into a distant roar if enough steam could get through. But a whistling sound in the exhaust is by no means a certain indication of the valves blowing through, for sometimes the nozzles get clogged up with a gummy substance from the lubricating oils, and a distinct whistling exhaust results therefrom. With a watchful ear the progress of degeneration in the valves can be noted day after day, for it is a decay which goes on by degrees, the inevitable slow destruction that friction inflicts upon rubbing surfaces. Pistons are more erratic in their calls for attention. With them it is quite common for a stalwart blow to start out without any warning, the cause generally being broken packing rings. The various kinds of steam packing seem more liable to have broken rings than the old fashioned spring packing, but they generally run longer with less attention.

The habit of closely watching the exhaust is likely to prove serviceable in more ways than in keeping the engineer posted on the condition of the steam distribution gear. Its sound often acts as a danger alarm which should never go unheeded. Many an engine has gone home on one side, and not a few have been towed in cold, through accidents to the valve gear which could have been prevented had the engineer attended to the warning voice of a false exhaust. The nuts work off an eccentric strap bolt and it drops out, letting the strap open far enough to cause an uneven valve travel. If the engineer hears this and stops immediately to examine the machinery he is likely to detect the defect before the strap breaks. Again, one side of the valve yoke may have snapped, leaving the other side to bear the load, or bolts belonging to different parts of the links or eccentric straps may be working out, so that the uniformity of the valve travel is affected, and the same result may be produced by the

eccentrics getting loose. Young engineers, to whom these pages are addressed, should make up their minds that an engine never exhausts an irregular note without something being the matter which does not admit of running to a station before being examined. It may only be an eccentric slipped a little way, a mishap that is not calculated to result disastrously, but on the other hand it is probably something of a more dangerous character.

An engineer of the Dayton & Evansville road went in with a broken eccentric strap. Questioning him about the accident brought out the fact, that in starting from a station he heard the engine make two or three curious exhausts, but he was running on a time order and did not wish to cause delay by stopping to examine the engine. But he did not go half a mile, when he found it necessary to stop and disconnect the engine, and by doing so held an express train 40 minutes.

A representative case of this kind happened on an Illinois road lately. An engineer was pulling a freight train up a grade when, to use his own words, "the engine began to exhaust in the funniest way you ever heard. She would get on to three legs for an engine length or so, then she would work as square and true as she ever did, but only for a few turns when she got to limping again." This runner knew that something was wrong and he determined to examine the engine at the next stopping point. But delays in such a case are full of peril. When he got over the grade and shut off steam there was a tumultuous rattling of the reverse lever, succeeded by a fearful pounding about the machinery, a tearing up of road bed sent a shower of sand and gravel over the train, then a scream from escaping steam and water drowned all other noises and the engine was enveloped in a cloud of blinding vapor. The forward bolt of one of the eccentric strap rods had worked out, and allowed the end of the rod to drop on to the track. Then it doubled up and tore away the whole side of the motion, and part of a broken eccentric strap knocked a hole in the fire box. Here was the progress towards destruction. A small pin got lost which permitted the nut of an important bolt to unscrew itself; then this bolt with many a warning jar and jerk escaped from its place in the link, and the conditions for a first class break down had come round. It was a railroad phase of the nursery tragedy.

"For want of a nail, the shoe was lost
For want of a shoe, the horse was lost."

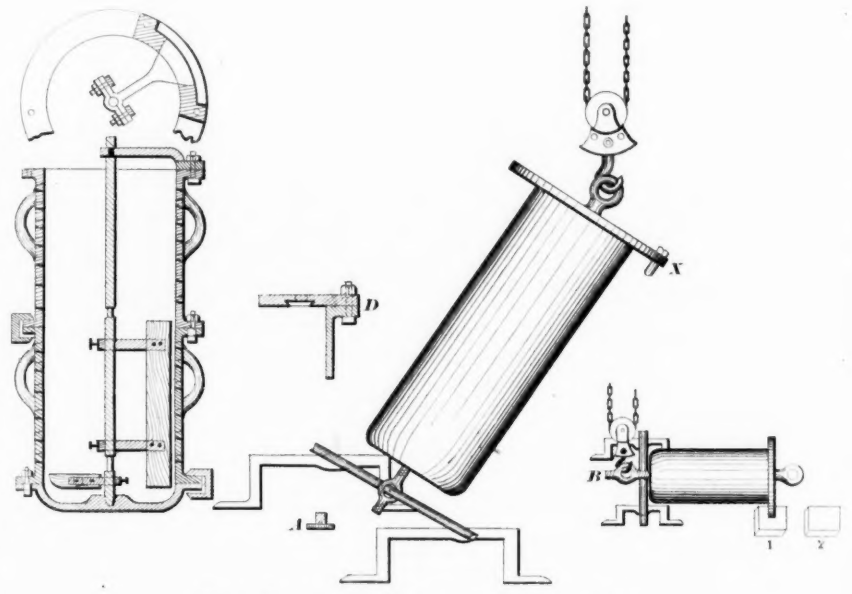
The hill which our train encounters nearly at the beginning of the journey is the *pons asinorum* of the division. The style in which it is ascended shows what kind of an engine pulls the train, and it tests in a searching manner the ability of the engineer. Our engine has got over the Summit successfully, and the succeeding descent is accomplished with comfort to the engine and security to the train. And so the rest of the trip goes on. The train speeds merrily along through green rolling prairies, away past leafy wood-lands and flowery meadows, it cuts a wide swath through long cornfields, startles into wakefulness the denizens of sleek farm houses, and raises a rill of excitement as it bounds through quiet villages. But every change of scene, every varied state of road bed—level track, ascending or descending grade—is prepared for in advance by our engine men. Their engine is found in proper time for each occasion as it requires the exertion of great power or permits the conservation of the machine's energy, the trained mind of the engineer being equal to all emergencies. Over long stretches of undulatory the train speeds, each man attending to his work so closely that the index of the steam gauge is almost stationary, and the water does not vary an inch in the glass. This is accomplished by regular firing and uniform boiler feeding, two operations which must go together to produce creditable results.—ANGUS SINCLAIR, *Railway Age*.

Iron Casings for Moulding Pots in Loam.

BY THOS. D. WEST.

The use of the flask or iron casing as shown in the sketch will be something new to many loam moulders. By this plan instead of rubbing the loam on to bricks it is rubbed on to iron. The pots made in these casings are used in a wire factory for heating wire.

In the morning when the casings are hoisted out and when they are hot, the first coat of loam is rubbed on to them and is about ⅛" in thickness. If the casings are not hot enough to dry the loam, they are run into the oven, and when dry and hot, are pulled out and lowered down on the shallow bottom and clamped.



IRON CASING FOR MOULDING POTS IN LOAM

There can be a thin sheet iron ring placed between the joints, to project out to the face of the sweep to support the loam and make a level joint.

After the center spindle is set into its bearing at the bottom, and secured at the top by the arm, as shown, the loam is rubbed on, the sweep passed around, and when this coat is stiff enough the finishing coat is put on and swept off smoothly.

The cut shows a sweep only half the length of the flask, that is coming up to where the flask is jointed in the middle. They are made so, in order to make pots small in diameter, that would not admit of a man standing up in them to sweep them up. The lower section is swept up and finished, the top section put on, a second sweep is screwed on above the lower one, and the top section swept up.

Were the pots large enough to admit of a man working inside them, the casing could be made without any joint at the middle, and the sweep made the whole length.

The thickness of loam used on the surface of the casings is 1" at the bottom, tapering up to ¾" at the top. This taper is to allow the casting to be hoisted out easily. The small sweep at the bottom, is for making the bottom of the pot. This is not swept up until the rest is formed and hoisted off; then the top arm is fastened on at the lower bearing. These bearings are turned on a square shaft, which is better for fastening the sweeps to than a round one. The bottom is rammed up with dry sand. In closing the two parts together when dry, the joint must be secured so as not to leave a fin, to which would prevent the casting from being hoisted off the casing. To insure this it is necessary to go down into the mould and daub up the opening with blacking. To moulders that have never used casing for loam work, this plan would seem dangerous, but having worked with this rigging myself, and knowing that splendid castings can be made in a very short time by its use, I would recommend casings for castings of a similar character when there is a large number to make. For a few pieces it would not pay, as the rigging is expensive to make. The gentleman who had this rigging made is a moulder and the proprietor of a foundry, and when he has something of this sort made it is made, as it should be, regardless of expense.

The main point in making such a rigging is to have plenty of vent holes in the flask or casing. The holes should not be over ⅜", as the pressure of the metal would be apt to burst through them if larger. It is better to have the holes the largest on the inside, as shown. The first coat of loam that goes on should be as open in texture as possible.

These pots could be swept up flat ways, as well as in the way shown, by having the flask split in halves like a roll flask. A wooden frame, the size and shape of the casting, should be made to lay on the joint of the flask when sweeping up the mould, to make the edge of the joint square and level.

A casting smaller than the one for which the casing was intended can be made by lining up the casing with brick. A flange or angle-iron, such as is used for a cupola, can be put on for holding up the brick. When building up the bricks put cinders between the joints and at the back to carry off the vent. The size of the pots made in these castings was from 2 feet 6" up to 4 feet in diameter, and in length about 7 feet. The thickness of the castings run from 1" up to 1½". In pouring, the iron fell from the top. The flanges of the casting should be turned up in the lathe; also the broad flange on the core barrel, as it is the flange bearing on the top flange of the casing that supports and holds up the core. When the pin, as shown at *X*, is in its seat you can rely on the thickness being equal at the bottom.

The core is a hay rope loam core, and in the two cuts is shown the manner of turning it over so as not to injure it.

The small cut shows the core barrel as it is hoisted off the oven carriage. It has to be dried standing on end. The blocks, Nos. 1 and 2, are used for assisting in throwing the core over, and when it is down the bar is put under the screw and the hook hitched on the square *B*, which is also used for turning the core barrel when making the core. The bar is then put through the eye of the screw or hook, the crane hitched to the other end and the barrel hoisted up on its end, as shown, so as to be lowered down into the pot. The little plug *A* has a screw cut on it the same as the hook, and when the hook is taken out, this plug is screwed into the hole, loamed over and blocked. A small fire of shavings is built under it to dry it. This plug has a square hole in it for screwing it in and out. The core barrel is cast with a bottom on, full of prickers. The top flange is bolted on the core barrel, as shown at *D*. In this flange there is a dovetailed groove cast at the point, to which the iron comes, and this is filled with loam, so that when the iron comes up it strikes sand instead of iron.

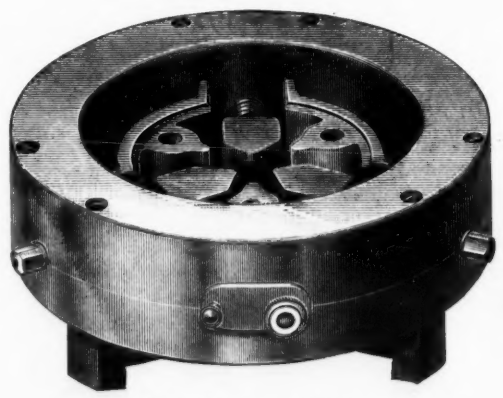
In fitting up the core barrel, the hook and screw must be central, so that the barrel will turn true on them, and the broad flange at exact right angle with the center bearings. The core barrel should have plenty of vent holes in it, and be made 3" smaller than the size of core, to allow 1½" on each side for the hay rope and loam.

One moulder and helper made this core and loamed the casing in one day, and the next day blacked the mould and core dry, put the pot together and cast it.

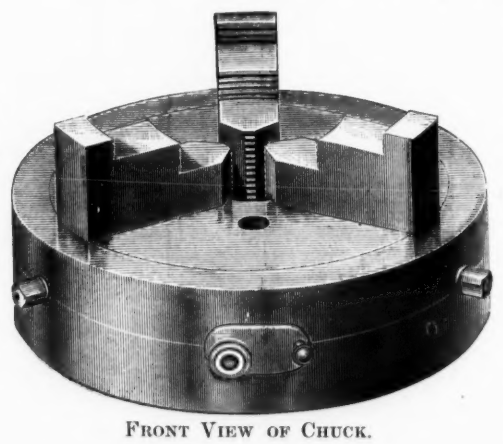
New Combination Chuck.

We illustrate herewith a new lathe chuck, made by the National Mfg. Co, which may be used either with universal or independent jaws. A front or face view, also a back view, are shown by the accompanying engravings.

The mechanism consists of a circular rack, and pinions upon the screws as is common to the universal chuck, and a loose ring having plates attached under the rack.



BACK VIEW OF CHUCK.



FRONT VIEW OF CHUCK.

The back of the shell is recessed to receive the plates when the chuck is required to work independently. To make it universal, after it has been worked independently, the jaws are to be moved towards the center until their back ends are perfectly true with the fine line on the face. The thumb nut shown upon the periphery of the chuck is to be unscrewed as far as it will turn and the small stop lug raised. Then by placing the thumb upon top of the nut, and the wrench upon one of the screws the slightest motion will throw the rack into gear with the pinions. The little plate upon the periphery should then be reversed, the stop lug dropped into the slot and the thumb nut turned down to place. The chuck is now perfectly true and ready for work. The combination attachment is very simple, and easy to operate.

The rack has a support under its whole width, which prevents the gear from straining apart when working, as would probably be the case were the rack supported only on one edge. The thumb nut being placed upon the periphery is less liable to injury by careless handling when detached from the lathe. The threads upon the screws have parallel sides with round top and bottom, as that form of threads is probably less liable to be injured by chips and cuttings than any other. Interchangeable and special-shaped jaws are furnished with these chucks when desired, and the regular jaws are ground all over so as to insure accuracy. The jaws are made of Norway iron carefully case hardened. The screws are also case hardened.

This chuck is being introduced by S. A. Smith, 154 Lake street, Chicago, Ill.

LETTERS FROM PRACTICAL MEN.

Turning True Tapers.

Editor American Machinist

Believing it will be of interest to many of your readers I will, with your consent, say something about the principle of turning true tapers in a lathe, and will also illustrate what I believe to be a new method of making lathe centers to use in taper work. I have never seen this center used by others and have never seen it illustrated. If the trade find it useful I am willing to let them use it without royalty—*no patent.*

From my observation I believe that a very great majority of machinists, when turning taper work, use the ordinary diamond point tool, which they set the same as ordinarily used on straight work *i. e.* with the point of the tool above the center.

The ordinary method of procedure in fitting tapers is to turn the smallest end down to the right size for a short distance, then to move the rest along the length of the taper, and turn a spot the size of the larger end; then to set dead center over so that the point of a tool fastened in the rest will measure the same distance from these cuts at each end. This distance is measured with a gauge. The tool is then set as upon straight work and a cut taken over the work; if to be fitted to a hole, the piece is taken from the lathe and a chalk mark made along the piece which is then tried in the hole. The rubbing of the chalk line will show whether the cut has been taken at the exact taper or not; if not, then the dead center is adjusted until the chalk mark will be rubbed equally at each end of the piece. The finishing cuts are then taken, when lo and behold! the taper has apparently changed, the piece no longer fits, and the result is that the workman (?) takes a file and files up the piece so that the testing chalk mark will be rubbed equally along the whole length.

Now I propose to demonstrate by the accompanying diagram that, in order to turn an absolutely true taper it is neccessary to set the tool so that the cutting point shall be the exact height of, or on the plane of the two centers. The fact that no true taper can be turned on a lathe with the tool set otherwise will, I think, be made apparent to all mechanics who will give the accompanying diagram a moment's study. I have never seen this principle graphically demonstrated in any publication, and believe it will be new to most if not all the readers of the AMERICAN MACHINIST, although the *fact* is well known to many.

In the accompanying diagram, *A. B.* represents the line of the live center, *C. D.*, the line of the dead center, *E. F.*, the height or plane of both centers above the lathe shears. *G. H.*[1] *H.*, the line of cut of tool, parallel to the lathe shears when tool is set at the height *H* above the plane of centers *E. F.*

The resulting taper (with tools set above centers) is shown in section by the figure *a*, *a*[1], *i*, *i*[1], and the resultant curve is shown by the line *a b c d e f g h* and *i*.

If the tool were properly set with its cutting point at *O*, on the plane of the centers, the resulting figure (shown by dotted lines *x*, *i*[1], *y*,) would be a true and perfect taper.

It will be readily seen, after a little study of this diagram, why every cut taken with a tool improperly set will alter the resulting taper, as well as make it curved.

In this diagram I have shown the dead center in the ordinary form, with the centers of work reamed with the ordinary center reamer. I think no explanation is necessary to show its defects.

I have represented the improved taper center as the live center, and I believe this to be the proper form to use on all taper work. These centers are easily made with a tool such as shown in *Fig.* 2, which tool is made by drilling through a piece of tool steel, reaming out from the back side with a taper reamer and filing out for neck as shown. Several sized holes should be drilled, the tool hardened and ground sharp on face. *Fig* 3 shows the center reamer, which is made the same as a center, then filed off on one side not quite ½ the diameter, clearance for cut is made by filing back from the cutting edge to a line which will leave the round part less than a semi-diameter.

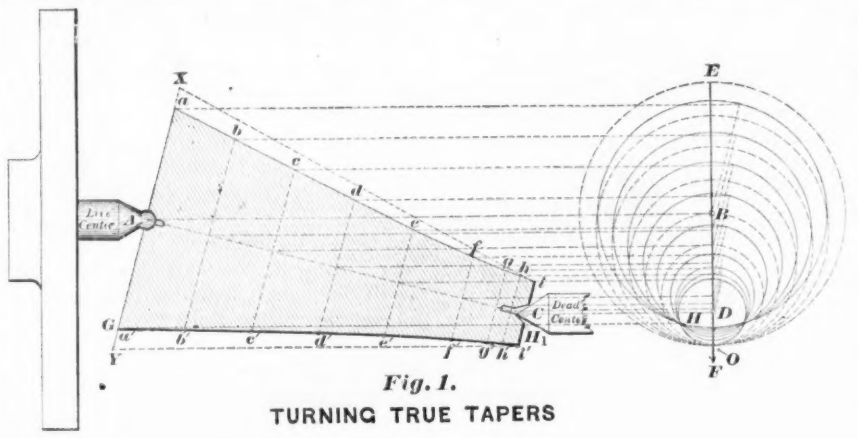


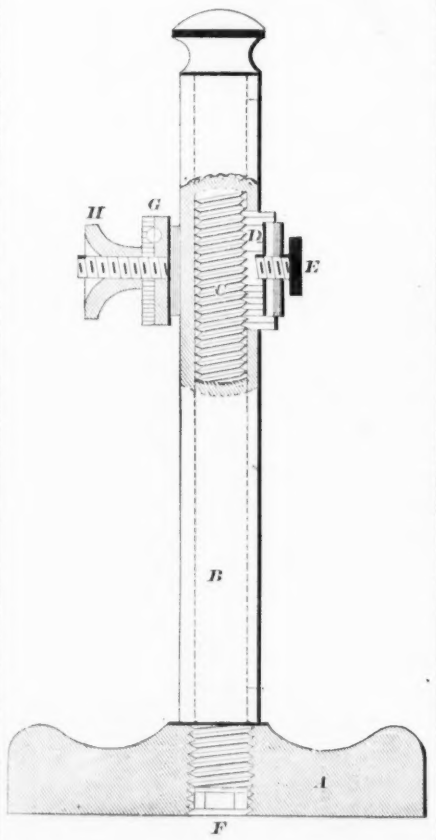
Fig. 1.
TURNING TRUE TAPERS

In turning tapers, it is necessary to oil both centers, and also to see that the tail of the dog can wag free and without great friction.

Many lathes have been constructed, the spindles of which have been reamed with reamers improperly made, with curved taper in the manner stated. It is almost, if not quite, impossible for any one to make a proper fit in such holes without filing. Shops which have such lathes should re-ream the spindles.

In my next, I will give you an article on taper reamers.

GEO. B. FOOTE.
Helena, Montana.



Another Surface Gauge.

Editor American Machinist:

If the surface gauge business is not overdone, I will give this one for the benefit of the readers of your valuable journal.

It is composed of base *A*, hollow spindle *B*, (cut away to show the screw *C*, which has a milled head on top), and nut and washer on the bottom, for the purpose of taking up end play at any time.

The spindle is slotted on one side to receive the gib *D*, which is threaded on one side to form a nut for the purpose of raising or lowering a sleeve which encircles the spindle *B*. This sleeve carries the pointer held by the washers, and nut *G* and *H*.

This sleeve is also slotted to allow of a lateral motion of gib *D*, equal to the depth of the thread on screw *C*.

This gib is drawn out of screw *C* by the operation of the milled head screw *E*, when the sleeve can be moved up or down to near where it is to be used, and by turning the screw *E* the gib *D* is set into the screw *C* again. Then by turning the screw *E* it can be set as close as you like.

When it is in its proper position, by tightening the screw *E* the sleeve is held very firm.

Ansonia, Conn. DICK.

Fig.2

Fig.3

Steam Engine Economy.

Editor American Machinist:

I have been trying to get Votre Ami's theory (in your issue of Jan. 28) of the relation of diameter to stroke of piston down to practice, but with your permission shall have to ask a little assistance from him.

He proposes to settle the question of cylinder condensation by making the stroke equal to two diameters, thereby exposing the least possible condensing surface in proportion to the volume of the cylinder, although he intimates that clearance would slightly modify his conclusions.

My 14″ cylinders, whatever the stroke, are fitted with pistons 4½″ deep (some builder's practice would be to make the piston 7″ deep), and I want to know if this does not modify the result more than the clearance—modify it, in fact, to such an extent, that the conclusion that the stroke should equal two diameters is entirely wrong in theory?

Whatever Votre Ami's answer may be to this, since the point is to get rid of condensing surface, why not cut 14″ off the end of my 14″x28″ cylinder, reduce the stroke to 14″, and increase the revolutions to 160?

If I do this, it will be on the assumption that the relation of condensing surface to the volume of cylinder has but little to do with the relation of *horse power* to condensing surface. If I don't do it, some other consideration of the subject of steam engine economy must prevent it. H. F. F.

How to Tell Cast Steel from Mushet Steel.

Editor American Machinist:

Although known to perhaps many, I do not remember to have seen in print, a very simple and effective way of determining, if a "chance" lathe or planer tool, or odd piece of steel, be of ordinary "Cast tool" or "Mushet" steel. It is to apply it to an emery wheel and observe the peculiarity of the *debris*; the color of which is very distinctive while being "consumed" or "decomposed" by its affinity for the oxygen of the atmosphere—in other words the sparks. Will your clever correspondent, Mr. S. W. Goodyear, or the author of "Why does steel harden?" kindly explain to us the philosophy of the cause of the distinction?

Toronto, Canada. W. DICKS.

Driving Power of Belts.—Selecting Cylinder Oil.

Editor American Machinist:

Recent tests show that the driving power of belts does not depend alone on the kind of belt, nor on the kind of pulley-face, but that where one kind of belt will drive better than another on a cast iron pulley, their comparative driving power is reversed on pulley-faces of wood or of wrought iron, or on those lagged with paper, leather, or rubber.

So, too, differences in driving power, which appear on small pulleys, or with low tensions, or with a given arc of contact, disappear on larger pulleys, or with higher tensions, or with a different arc of contact.

The selection of a cylinder oil should be governed by the following elements: diameter, stroke and speed of piston; initial pressure; point of cut off; type of engine; method of feeding the oil; also whether the exhaust goes into the open air, into a condenser, or is returned to the boiler as part of the feed water. There is no use in trying an oil with a fire test way up in the five-hundreds, when the steam pressure is only 80 lbs. by the gauge, and hence, temperature never over 325° F. in the cylinder. The question of price should be considered in connection with the durability of the oil, rather than with reference to any other property.

Philadelphia, Pa. ROBERT GRIMSHAW.

More About Voyages At Sea.

Editor American Machinist:

Let us consider ourselves in mid-ocean steaming along nicely, and that the engineer on watch is admiring the working of the engine and the progress we are making. The time is near midnight, when suddenly the gong strikes one (which means to stop when the engine is running). The engineer must stop his engine promptly, and while he is doing that the gong strikes two, which is to back. We know something has happened, or about to happen, but we have no time to make any inquiries but must stand faithfully by the bar until the last, for even our own lives may depend on our actions at this time. Great care must be taken not to reverse the engine too suddenly, for something may break. The engineer must use good judgment, and if he does not know just what to do, he had better do nothing. Such engines are easily controlled by one man, but must not under any circumstances be trifled or fooled with. The engine in this case was duly stopped and reversed, bringing the ship to a stand-still, and in 11 minutes we got under way again. The stop must be recorded in the log-book, and the time it occurred. The next morning we hear a sharp quick sound, and know by it that some part of the engine has broken. On examination we find the top of the circulating pump has broken, also that the cylinder of the pump has cracked from the top, a little more than half way down. This then must be repaired temporarily or else we will have to work the engine high pressure or non-condensing, for we cannot use the surface condenser without the circulating pump.

We will repair the pump in the following manner: 1st. Draw the crack together by means of ears or lugs bolted on the outside of the cylinder, one on each side of the crack and down from the top about 10 inches. Through these we pass a strong bolt, and by tightening on the bolt we can draw the crack pretty close. We then take a cape chisel about ⅜″ wide, and run a cut with it the whole length of the crack on the inside of the pump, taking care that the crack is in the center of the cut. The cut we will make about ¼ inch deep, and into this cut we will run a soft copper wire or rod, driving it in tight and peining it down until the crack is filled, then file and scrape it until it is as smooth as the rest of the cylinder. This will stop the crack. We find the cover is so badly broken that we cannot do anything with it, and, having no extra one in stock, we call upon the ship's carpenter and have one made of plank. It will answer our purpose very well, if we take care to place braces on it from the center on top up to the deck or some beams overhead, to keep it from springing. The writer repaired a circulating-pump in this way once at sea, and we made with it a run of 2,500 miles, and the cover and the cracked cylinder were in use three years after that, I am sure. I have also repaired cracked cylinders on locomotives in the same way, and they would be steam tight at 120 lbs. pressure. After this was done and we were again under steam, we glanced up to the engine register and found that the engine had made 166,320 revolutions since we left New York. How many miles had we made since we started, assuming that it is just seven days since we left?

The number of revolutions is 166,320, and

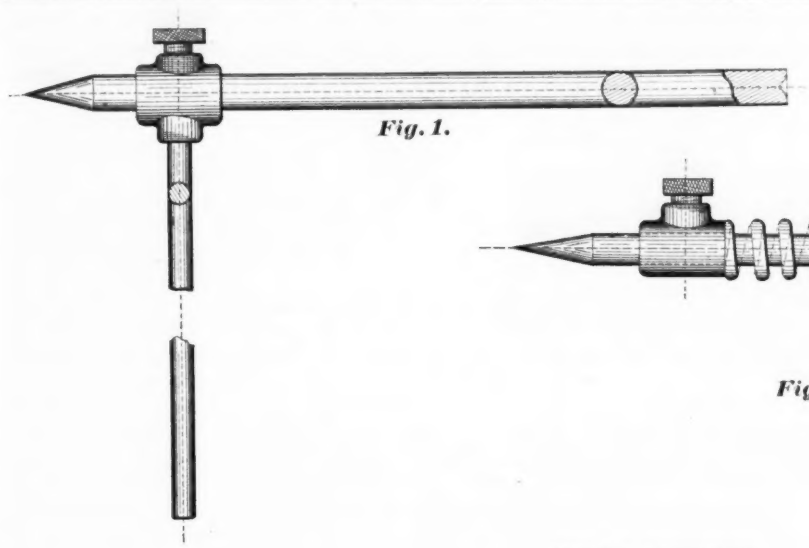


Fig. 1.

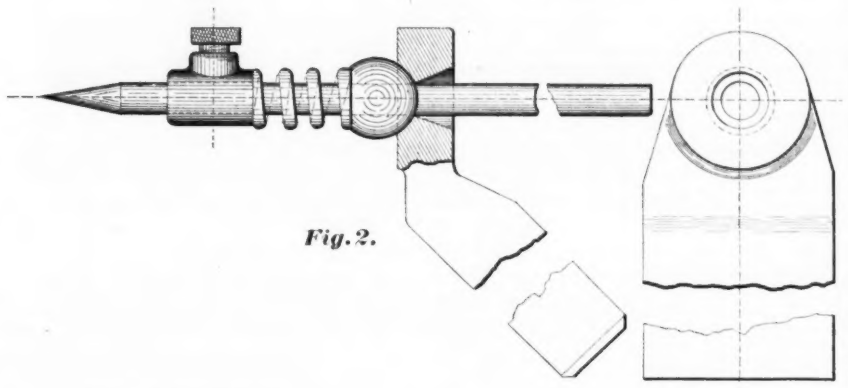
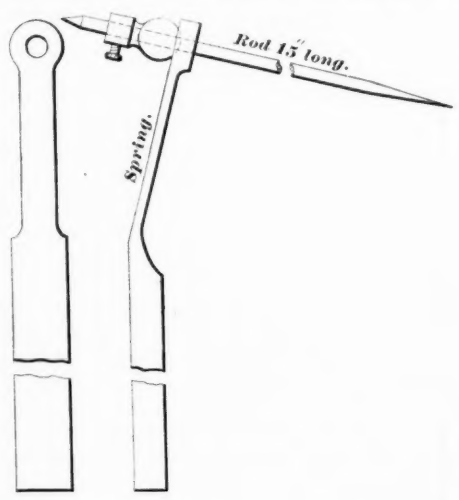


Fig. 2.

CENTER INDICATORS.

$\frac{166\,320}{7\times24\times60}$=16.5, the average number of revolutions per minute. Since the paddle-wheels are 33 feet in diameter, in one revolution they will propel the ship forward 103.8 feet. But they do not work as closely as that – and why? Because there is a certain percentage of loss called the slip of the wheels which must be deducted from the travel if there was no slip. In this case I will call the loss 26 per cent., which is not far from right, with a radial wheel. If in seven days the engine has made



166,320 revolutions we have traveled 2,101 miles as follows:

166,320+103.8(No. of feet)=17264016 feet. Deduct 26 per cent., and we have 12,775,372, which divided by 6080=2101 the number of miles in seven days, and $\frac{2101}{7\times24}$=12.5 miles, the rate per hour. Consequently, if we do as well the rest of the voyage after deducting time lost in making our repairs, we will arrive in Gibralter in 10 days and 13 hours sailing time, or 11 hours sooner than we calculated on when we left N.Y. The distance traveled by latitude and longitude calculations brings us 2108.5 miles.

Corning, N. Y. STARTING BAR.

Another Tool For Truing up Work.

Editor American Machinist:

Above is shown a tool for truing up work that I think just knocks the spots right off from "Short Cut." Have used it several years and found it to be just as good as gold. It does not take half the time to make it that his does, and you know time is money.

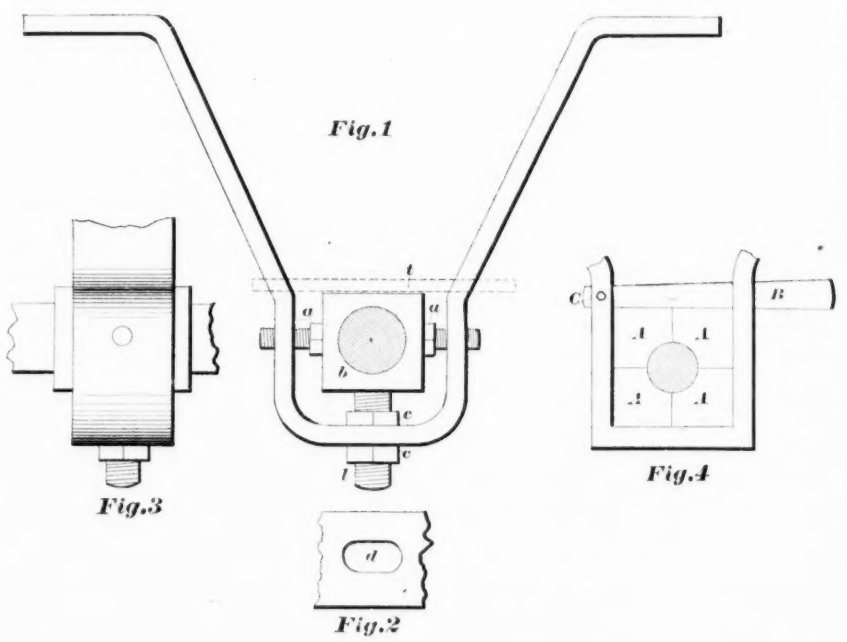
Waterbury, Conn. E. J. C.

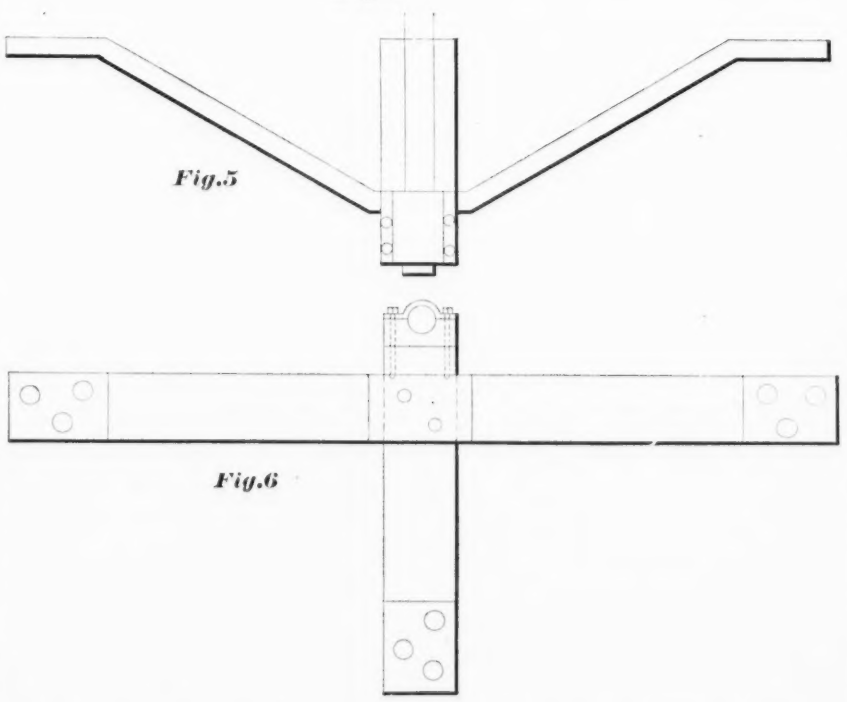
Center Indicators.

Editor American Machinist:

If another article with drawings of center indicators for truing work up on face plates will not be out of place, I should like to present your readers with a description of two simple and cheap indicators. They can be so cheaply made that I am led to believe that every machinist will possess one, if not both, after seeing the drawings. The rod of number one indicator that is on the centers should be about 8 inches long (the shorter the better), $\frac{3}{16}$ of an inch diameter with one end pointed. Countersink the other end somewhat like the angle of the head of a woodscrew, so that as the rod vibrates the rod will always bear upon the extreme point; make the sliding rod about 18 inches long. The longer the better. Let this rod rest upon the carriage so the vibrations can be easily detected; slide the rod as close to the work as possible. Indicator number two is made to fit in the tool post. The ball should be made to slide freely upon the rod, so that when the carriage pushes the rod into the center of the work the tension of the spring will keep the rod in place. Countersink the back of the holder, as shown, so that the rod will not bind. Have the rod at least fifteen inches long. C. E. SIMONDS.

Grant & Bogert, Machine Tool Works, Flushing, Long Island.





Cheap Hangers.

Editor American Machinist:

I have been greatly interested in the shafting discussion, especially couplings, and in the future may say something of them.

In your issue of Jan. 14, L. F. Lyne, shows some handy hangers. I send you sketches of cheap and handy hangers and boxes I have used, but do not claim them as original, as my father used same as sketch No. 4, in mill work, over 50 years ago.

Fig. 1 makes a very handy rig, and can be made for less than a pattern, and with bar iron at $2\frac{3}{4}$ or 3 cents a pound would not cost any more than the cast hanger.

The box may be either a cast iron or a forging, with the hole left large enough to babbitt; *a a* are adjusting screws, with heads bearing against the box as they are shown. For a cheap hanger I do not think anything can beat the one shown by Fig. 4.

The hanger is made of common flat iron; a slot is put through for key *B*, and a set screw *C* to hold it. The boxes are made of four blocks of wood, *A A A A*, cut so the end of the grain will form the bearing and any wear can be taken up by planing off the blocks. If they are soaked in oil or hot tallow and plumbago before putting in, they will run with less oil and wear longer than any metal bearing that can be made.

Maple, Basswood and pine make good boxes.

The Wall Bracket by L. F. Lyne is good, but I think one like Figs. 5 and 6 would be just as good and a great deal cheaper.

I put up such a rig 6 years ago, and it is as firm and stiff as ever.

It was made of flat bar iron 1″x3″, projecting from the wall 34″ and held by 9, ¾″ bolts, passing through a 16″ brick wall. The shaft is 3″ diameter and carries a 36″ pulley, 9″ face.

Erie, Pa. J. H. STONEMETZ.

Checks in Locomotive Boiler Heads.

Editor American Machinist:

In your issue of January 7, in a leading article on "Locomotive Boiler Fixtures and Slide Valves," you recommend that the checks for injectors should be placed in the boiler head, since there they are less liable to be knocked off in case of collisions. With all due deference for your opinion, I submit that in the ordinary locomotive there are far too many fixtures on the boiler head already, and if locomotive builders follow your proposal and stick a check or two there, it will certainly be like the last straw that breaks the camel's back; so I solicit you and the builders to refrain from placing more burdens upon the already overtaxed boiler head.

I have seen the remains of engines brought in from a great many collisions, ditchings and other accidents, and it appeared to me that the boiler-head attachments suffered more than those placed in any position about the engine, except, perhaps, the head-light brackets. The positions the checks now occupy—back of smoke box or ahead of the wagon top—appear to be about the safest points that could be chosen to insure immunity from being knocked off in case of accident. In the event of a violent collision, no precautions can be made to prevent some steam attachments from being broken off, which are liable to scald train men or passengers. But injury from such a source can be limited, to some extent, by reducing the number of these attachments on the parts of the engine where men are most likely to be when an accident happens, and that point is in the cab; so the aim of builders and master mechanics should be to supply, from one stand, as many as possible of the cocks needed in operating. A very good device for this purpose is a stand having a self-closing valve, so that, should the whole thing be knocked off, the valve will plug up the hole in the boiler.

In regard to this check business there is another reason why it should not be stuck in the boiler head. The gases of combustion which are at their hottest temperature in leaving the fire box get cooled down in passing through the flues, and it is important that the forward end of the boiler should receive the supply of water, since the comparatively low temperature thereby maintained at that point will absorb the greater proportion of heat from the gases, before they pass into the smoke box. Of late years there has been a tendency to ignore this principle of heat economy in locating check valves, and much loss of heat has resulted therefrom. The deposit of incrustation or mud which has a tendency to accumulate near the check valve, can be controlled as easily in the barrel of the boiler as it can be cleaned from the fire box, if proper methods of washing out are followed.

ANGUS,
Cedar Rapids, Iowa.

Our editorial in the AMERICAN MACHINIST of January 7, 1882, advocated the placing of all cocks upon a single stand properly drained and located upon the top of the boiler. Upon the regular style of anthracite coal burning locomotive the gauge cocks are usually placed either in the shell of the boiler or upon a column in front of the cab, so that there are no cocks of any kind whatever attached to the boiler head.

The check valves which we advocate are to be located as near the bottom of the boiler as possible, so that they will be better protected in case of a collision. We take the same ground that has already been occupied by eminent engineers, that all valves and cocks upon locomotive boilers should open *inward*, so that if the pipes or cocks become broken the pressure upon the valve will keep it closed, so that little or no water or steam can escape from the boiler. It is a very easy matter to construct a check valve for an injector to open inward, so that the parts which project outside the boiler head may be entirely torn away and yet allow no water to escape. We are under the impression, that the front end of a locomotive boiler is not as cool as our correspondent anticipates, for we have rode upon a bumper beam when the smoke box and cast iron front was red hot.

The feed water from an injector is at a temperature very near to the boiling point, hence it would not cool the hot sheets of the fire box as much as if it came from a pump. Sediment deposited in the cylinder part of a boiler is more liable to be neglected than if it were deposited where it had to be removed.

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NEW YORK, FEBRUARY 4, 1882.

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The article on page 4, entitled "How to Proportion Slide Valves," by Hugo Bilgram, (author of a standard work on Slide Valve Gears) will be found very useful for engineers. It should be studied and preserved for reference.

Municipal Dishonesty and Manufacturing Interests.

A number of cities and towns in different parts of the country are reminded, not only of the policy of honesty, but as well as of the advantages of conducting their affairs on business principles, by the removal and by the contemplated removal of large manufacturing interests, on account of excessive taxation. This burdensome demand is sometimes—perhaps generally—made necessary on the part of the authorities by the dishonesty of officials, and sometimes by unbusiness-like transactions. In either case, the result is the same; that is, the burden of taxation becomes so great that first of all portable capital puts itself out of reach, leaving those who cannot so readily change their location to bear the increased burden, and finally, manufacturers in self-defence follow the example set them.

The greater weight of the misfortune to localities incident to the removal of manufacturing enterprises is never made apparent, since it is only when some large concern removes that the matter receives serious attention, while the aggregate of smaller enterprises driven away by the same cause, and that are not noticed because of their assumed insignificance, generally greatly exceeds in importance the one or two large ones.

The most serious of all losses is, however, probably a negative one, that is the loss of prospective gains that would follow the establishment of industrial enterprises. Unfortunately, the value to a community of the presence of manufacturing establishments, employing a large number of men, is seldom appreciated at its full value, and their removal is looked upon simply as the withdrawal of so much tax-paying property. Particularly is this true of the Middle and Eastern States, which, having become accustomed to the presence of manufacturing interests for so long a time, look upon them as a matter of course.

In point of fact, the amount paid in taxes by industrial establishments is of trifling importance compared with the other benefits resulting from their presence. The individual who pays taxes on $500,000, in stocks for instance, will benefit the community to the extent of a few hundred dollars yearly, but the same sum invested in manufacturing will not only pay taxes on the amount invested, but the employés will, perhaps, spend one-half this amount paid to them yearly as wages, and which further augments the business of the locality, and helps to swell enormously the taxable valuation. This is something that would seem to be much better appreciated in the Western States than elsewhere in the country, and to this appreciation is due largely the increase of manufacturing in that section, at the expense of other locations that do not seem to appreciate the subject in its full significance.

So long as taxes are reasonably low the manufacturer is satisfied, but when from the effect of stealing, and municipal dishonesty and incompetency, they assume outrageous proportions, he not only will not locate where such conditions exist, but others already located will remove to more favorable situations; a course to which they are often literally driven by the demands of business competition.

Some towns and cities, notably in the Western States, make efforts in the direction of securing, either at first or by removal, the locating of manufacturing interests, by offering cheap lands and nominal taxation for a number of years, in which efforts they are materially assisted by the apparent determination of other localities to drive away such interests.

Established industries as a rule are not induced to remove because they are honestly taxed for honest purposes, but because they are dishonestly taxed for dishonest purposes, and, from a consideration of the fact that the reputation for levying exorbitant taxes, and squandering money in ways that would not be tolerated by decent business management is generally permanent.

We hear a great deal of the influence of natural advantages in locating manufactories; advantages that are sometimes more apparent than real. There are many towns and cities that would do well to try, for the same purpose, the artificial advantages of common honesty and sound business methods.

The Prison Labor Contract System.

The settled policy of the AMERICAN MACHINIST is not to assail the published opinions of our contemporaries, however they may differ from our own, except when morally bound to do so in our own defense. The article which prompts us at this time to take public exception to the position of one of our exchanges, is an editorial in the *Iron Age*, two weeks ago, on "Prison Contracts and Convict Competition," lauding the prison labor contract system as now practiced, also the firm of Perry & Co., now employing at 56 cents a day for each able-bodied man a horde of convicts at Sing-Sing prison in the manufacture of stoves. "The agitation against convict labor," says that journal, "is kept alive by demagogues, who are seeking to make it a stepping-stone to political advancement." It is but fair to assume from the context of the editorial under notice, that by "convict labor," is meant the prison contract system, the topic under discussion. As our readers well know, we have taken an active part (without making it a hobby) in the agitation against the corrupt and iniquitous prison labor-contract system, and, we may add propose to continue the agitation so long as that system is permitted by the laws upon our Statute books. As to being demagogues, we must declare that none of the conductors of the AMERICAN MACHINIST have ever sought political advancement, and in view of the rapid and permanent growth of our business—solely the publication of this journal—it is not probable that the allurements of office will ever cause us to neglect it for the political arena.

In order to make the position of our contemporary clear, as well as our own remarks: we quote the beginning of the article:

"A correspondent asks us to publish a letter advocating the passage of laws in the different States limiting to 100 the number of convicts who may be employed by contract in any one branch of manufacturing. We respectfully decline, for two reasons: there is nothing new in the idea, and it is not practicable. The passage of such a law would be equivalent to abolishing the contract system altogether, as no contractor would bother with convicts if he could only employ 100 of them. Now, let us suppose such a law was enacted in New York State, and the contractors now employing convicts should refuse to renew their contracts on so obviously unfair and unbusiness-like a basis. What would be the consequence? Either the convicts must be supported in idleness, or the State must employ them in producing something for sale, the profits of which could be devoted to meeting the expenses of the prisons."

The above extract is strongly suggestive of the oft-quoted sayings of Josh Billings—"It is better to know less than to know so many things that aint so." We have before us the text of a bill passed by the New Jersey Legislature, and approved March 25th, 1881, forbidding the supervisor or board of inspectors of prisons, "to contract with any person or corporation to hire out the labor of the prisoners, or any part of them, exceeding one hundred persons in number at any time, in the prosecution or conduct of any special branch of industry, trade or business of making or manufacturing goods, wares or merchandise of any kind whatsoever." This act took effect immediately, and with what result our readers have already been informed, but for the information of our contemporary we reproduce it from an editorial in our issue of December 10th, 1881.

"This law was assailed by those who believed that the almighty dollar is of more consequence than the prosperity of free working mechanics. Serious losses to be met by the taxpayers were predicted. The result has been that all the prisoners are employed, in seven different trades. The earnings are at the rate of $10,000 a year more than they were under the old system."

As prison industry is very much the same in New Jersey as in New York and other States, no good reason can be advanced why a similar restriction would not work as well in New York, or in any other State, as in New Jersey. But this is only a mitigation of the evil; the system should be abolished as fully as was African Slavery. We quote further from the *Iron Age:*

"A careful examination of the facts does not show that the contract system is an injury to citizens, and with all the talk and clamor which this question has created, we have yet to hear that any one has made out a case showing that he has a solid basis for complaint. The grievance is largely one of sentiment, exaggerated by misrepresentation of facts, and by the inflammatory appeals of politicians and agitators."

This is a bare assertion without attempt at argument. We will not dispute the statement that our contemporary has never heard of such a case, but a perusal of the public prints for months and years past will show cases enough to convince any unprejudiced investigator. Two years ago, for instance, the free manufacture of hats in New Jersey was so seriously oppressed by prison competition that, in obedience to popular demand, the legislature of that State abolished the manufacture of hats in the prisons. Other trades in New Jersey and elsewhere are endeavoring to persuade our lawmakers to leave each concern free to compete with its neighbors, without being obliged to withstand State competition. We quote again from the editorial: "It is not true that manufacturers employing convicts have an important advantage over those employing citizens." Further along, we find Perry & Co., commended for what work they "have done in organizing the convicts into *an efficient corps of foundry workmen.*" We learn that several hundred convicts are employed by this firm in stove making at 56 cents a day for each able-bodied workmen. If this gang of convicts—excuse us—this efficient corps of foundry workman, at that price does not give the contractors an important advantage over those employing citizens, we should like to know what wages our contemporary expects citizen moulders to accept in order to keep down that advantage.

Two or three years ago legislative committees were appointed in several States to investigate, during Summer recess, the prison labor question, and report at their next sessions. We do not remember to have seen one of the reports printed in any newspaper. The only *official* document within our reach that throws any light upon the effect of prison labor competition, is the report of U. S. Consul Stanton, from Barmen, Germany, sent out by the State Department at Washington, in a volume entitled "State of Labor in Europe." We quote a few facts from that report:

"The production of locks in Cologne, Werden and Münster is so great as to make this article virtually a monopoly of those prisons. It is difficult to draw an accurate comparison between the labor of freemen and criminals, but, taking a day's wages as a standard, and assuming that a criminal produces half as much as a freeman, although that is a low estimate, since the use of machinery places skilled and unskilled labor on a par, the daily wages of a criminal amount to but 80 or 100 pfennige, or not 50 per cent. of the amount which must be paid to free labor, and the contractor has, moreover, the free use of shops, heat, light, and, in some prisons, of steam, in consideration of a small remuneration for coal; while, if against this, the cost of free labor, together with that of factories, repairs, interest, etc., be placed, it becomes perfectly plain that contractors for prison labor are *secure from all competition.*

"A proof of this is afforded in the official report of the Ratibon prison, where, according to which reports, the contractors having but a few years ago introduced the manufacture of hardware, have conquered the markets of Silesia, Prussia, Pomerania and Saxony. They underbid every competitor, and where free labor enters the lists against them it inevitably succumbs, for prison contractors are in a position to sell much cheaper than they do. If it be opposed that the products of free labor are of much superior quality, this advantage is more than balanced by the cheap prices of prison wares.

"Whilst ordinarily the competition of criminals is bad enough, in times of depression and business stagnation the effect is simply ruinous, for the terms of the contract forbidding any limitation of the production, contractors, in order to realize, are compelled to throw their goods at any price on the already overstocked markets, which, in the district of Haagen, has resulted in the *utter ruin of many branches of hardware.*"

The conditions and effects of prison con-

tract labor are much the same in this country as in Germany, except that there the people have but little to do with remedying the evil, while here they have all to do with it. There the officers of the government are the *masters*, here they are (or should be) the *servants* of the people. Advantage is being taken of this prosperous and lively business era, by the prison contractors to strengthen their hands, and, if possible, to create a public sentiment in their favor.

The contract for stove makers in Sing-Sing prison would expire this year, but Perry & Co. have, we understand, had the contract *extended five years*. When we reach another dull era of general manufacturing business, unless precautionary measures are taken in season to prevent it, the prison contractors will be intrenched so firmly as to be "secure from all competition."

As for making prisons self-supporting, the reports are very deceptive. For instance, The New York Supt. of State Prisons, in his last annual report figures the excess of earning over expenditures, for the year ending Sept. 30, 1881, as $564.35. How he gets a showing of profit on the books may be partly explained by reading Consul Stanton's exposure of the German prison contract system, as above.

Leaving cost of prisons, shops, machinery, light, heat, salaries of State officials, etc., out of account, an apparently small profit may be shown.

The bugbear of having to support prisoners in idleness if the contract system is abolished is hardly worth attention. California has stopped the prison contract system by an amendment to her State Constitution, but the convicts are all employed by the State doing useful work that does not compete with the labor of citizens. The sooner other States do away with this iniquitous system the better it will be for manufacturers and mechanics.

QUESTIONS & ANSWERS.

Under this head we propose to answer questions sent us, pertaining to our specialty, correctly, and according to common sense methods.

(36) J. S. B., Lowell, Mass., asks: How can I make a square hole in a solid lathe tail stock? *A.* You can slot, or broach it.

(37) W. H. D., Branford, Conn., asks: Why does steel crack when plunged into water to harden? *A.* One reason is unequal contraction in cooling. There are undoubtedly other reasons, about which little is known.

(38) J. F., Newark, N. J., asks: How much lead should the valve of the low-pressure cylinder of a compound engine have when the exhaust begins to open from the high-pressure cylinder? *A.* The cylinders of a compound engine are so arranged as to make the lead of each valve the same as for a single-cylinder engine; that is, without reference to the other cylinder.

(39) H. B. T., Geneva, Ohio, asks: How can I sharpen files with acid? *A.* We have sometimes subjected small files to the following: Cleanse from all foreign matter, removing the grease by using a solution of potash and water; then dip in a solution of eight parts water, three parts sulphuric acid and one part nitric acid. Take out, wash off, dry and oil. There are other processes, but this is perhaps as good as any, and we do not recommend it as of much practical value.

(40) A. M. P. C., St. Paul, Minn., asks: Please give me a good lacquer for finished brass work? *A.* A good gold lacquer is made by mixing, in a clean tin vessel, 1 pound of ground turmeric, 1½ ounces of powdered gamboge, 3½ ounces of powdered gum sandarach, ¾ of a pound of shellac, and 2 gallons of spirits of wine. After thoroughly agitating, strain and add one pint of turpentine varnish, thoroughly mixing the whole.

(41) J. A. M., Pawtucket, R. I., writes: I am making arrangements to run some calico printing machines with a small engine for each machine. I find that a two-cylinder engine does not start up promptly and steadily, and am thinking of using three cylinders. Can you give me any advice? *A.* If we were to advise you to make any change from your two cylinders, it would be to one instead of to three. If you have an engine large enough for the purpose, properly constructed, and use a balance wheel heavy enough, you will have no trouble with either one, two or three cylinders. The more cylinders you use, the more your power will cost you.

(42) H. E. W., Robinson, Colorado, writes: Some friends of mine in Ohio are about to start in the business of manufacturing freight and box cars. Do you think it a good business, and would you advise me to invest in it? *A.* We believe car building is a good business, but it is precisely like any other legitimate business; that is, it requires good management and a favorable locality for success. We can offer you no advice with the knowledge at hand, except that you canvass carefully your own fitness, as well as that of your friends, for this particular business; also the locality, with reference to such things as enter into the cost of construction, keeping in mind the fact that you will eventually find yourselves in competition with large and well-appointed establishments of a similar character. This of itself, however, is no reason why you should not enter into the business.

(43) J. J. B., Montreal, Canada, in reference to his question on screw cutting in issue of December 10, writes: In the list of change gears given, it should have been 56 in place of 36. He asks: 1. How can I find the gears that will cut the nearest to the required thread? *A.* If you will carefully consult the article in the AMERICAN MACHINIST of August 20, 1881, "Screw Cutting on the Engine Lathe," we think you can readily solve the problem for yourself. 2. Two of us had an argument in the shop. I claim that in the list of gears above referred to, you must use 28 and 112 to cut a screw 16 threads to the inch. The other party claims there are other gears that will cut it. Which is right? *A.* The lead screw is 4 to the inch, and the screw you wish to cut is 16; that is, their proportion is 1 to 4. If you multiply 28 by 4, the product is 112, hence 28 and 112 will cut 16 threads. The next larger gear is 32, and to use this gear you must have 128 (32×4=128), which is not on the list. Taking the next gear, 40, you must have 160, which is larger than any gear on the list, so that it is not necessary to investigate further to see that there are no other gears than those mentioned, by the use of which you can cut 16 threads.

BUSINESS SPECIALS.

Transient advertisements 50 cts. a line for each insertion under this head. About seven words make a line. Should be received Wednesday morning.

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Presses and Dies. Ayar Mach. Works, Salem, N. J.

Presses & Dies. Ferracute Mach. Co., Bridgeton, N.J.

Alfred Wilkinson, Expert Tests of Steam Engines and Boilers, 123 N. 4th St., Phila.

List of Machinists in U. S. and Canada; just compiled. Price $10. A. C. Farley & Co., Philadelphia.

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"Slide Valve Gears," by Hugo Bilgram, published by Claxton & Co., Phila., describes the easiest method known for correctly proportioning slide valves, link-motions and cut-off gears; Price, $1.00.

New York, January 12, 1882.—I beg to request my correspondents to address me at my post office box, 3,306, New York City, and not at the office of "The Mechanical Engineer," in which none of my writings will in future appear, and with which I shall henceforth have no connection whatever. Joshua Rose, M. E.

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The publishers of the Engineering and Mining Journal will issue January 4, 1882, and each Wednesday thereafter, COAL, a weekly journal, to be devoted exclusively to the interests of the coal trade, including: 1. The mining and preparation of coal for market. 2. Its transportation. 3. The marketing of coal. 4. The economical use of coal. COAL will be profusely illustrated, and the freight, labor and wages questions will be treated in a thorough and popular manner. The statistical information of COAL will be collected with great labor and care, and will give the current production of coal throughout the country. COAL will be conducted by gentlemen of ability and great experience in every department of the coal trade, and will have, at the outset, a large staff of reliable correspondents at the different coal centers of the country. Subscription price, $2 per year. Specimen copies on application. Address The Scientific Publishing Company, 27 Park Place, New York. P. O. Box 1833.

Ealy's "Blue Book"—Credits of the machinery, hardware, implement and metal trades. Published semi-annually by the National Hardware and Stove Association, 51 Chambers Street, New York, and 79 Dearborn street, Chicago; John W. Ealy, General Manager. This book contains information regarding the capital and pay ratings of over 60,000 dealers and manufacturers, together with a classified list of all manufacturers, wholesale and retail dealers in hardware, iron, machinery, agricultural implements; railway, machinists', engineers' and boiler makers' supplies, brass goods, plumbers, and dealers in plumber's supplies; stoves, tin, cutlery, guns, and the users of iron and metals generally. This reference list has heretofore been confined exclusively to the hardware and metal trades; the machinery trades have been recently added to the long-established features already existing. Furnishing detailed written reports to subscribers of the condition and paying qualities of any dealer is an important feature of the system. Published January and July. Price, $75 for two books, written reports, etc. Address John W. Ealy, General Manager, 51 Chambers Street, New York.

MANUFACTURES.

Newcastle, Pa., is to have a new paper mill, operated by a company with a capital of $50,000.

The Stow Flexible Shaft Company, Philadelphia, Pa., are filling large orders for their portable tools.

Henry Disston & Sons, Philadelphia, Pa., have purchased land on which to erect additional buildings.

The Lima Car Company, Lima, Ohio, are already in operation. They have a present capacity of 15 cars daily.

The New York, New Haven & Hartford Railroad Company have commenced work on a new machine shop at Hartford.

Frick & Co., Waynesboro, Pa., steam and traction engines, etc., are running overtime by the aid of the electric light.

The Chicago Car Roofing Company are about to transfer its factories from Chicago to Wheeling, W. Va., in order to be nearer supplies.

The Cliff, Righter & Co.'s car spring works in Oswego, N. Y., have just begun business. They employ fifteen men.

The Baldwin Locomotive Works write us: "Our product last year, 1881, was 555 locomotives; this year we expect to make it at *least* 600."

The citizens of Wellington, Ohio, have subscribed $30,000 to insure the locating of the Lake Erie and Wheeling Railroad shops at that place.

The Railway Barb Fence Company, of Cuyahoga Falls, Ohio, are shipping goods to Adelaide, Queensland, on order from the British Government.

J. Stevens & Co., Chicopee Falls, Mass., have issued new circulars, illustrated catalogues and price lists for 1882, describing their specialties.

Duvall & Co., Zanesville, Ohio, are running their machine shop fifteen hours a day. They are crowded with orders for portable engines and saw mills.

Several prominent business men and capitalists of St. Louis, Mo., have taken the preliminary steps to organize a company with a capital of $500,000, to erect locomotive works at that place.

H. I. Creighton, Springfield, Ohio, has built an addition to his works for manufacturing the improved Common Sense Steam Engine. He is making new patterns of larger sizes of this engine.

Tanner & Delaney, Richmond, Va., are about to erect buildings near that city for the manufacture of small narrow gauge locomotives, portable and stationary engines, and a general line of machinery.

D. Saunders' Sons, Yonkers, N. Y., have just issued a new illustrated catalogue containing descriptions of Pipe Threading and Tapping Machinery, much of which is new. The line of Gas Fitters' Tools is very complete.

C. W. LeCount, South Norwalk, has just issued a new price list of seven sizes of new hardened, doubled ended wrenches. These wrenches are fitted to the U. S. Standard Nuts from ¼ inch to 1½ inches.

The erection of the Penn. Hardware Company's new building in Reading, Pa., will be pushed forward as fast as possible. The new building will contain four foundries, and give employment to 600 hands.

D. Saunders' Sons, Yonkers, N. Y., have just shipped an 8-inch pipe threading and cutting machine and four small machines of same kind, also two tapping machines, with attachments, to W. T. Garratt, San Francisco, Cal.

Yerkes & Plumb, edge tool manufacturers, Philadelphia, Pa., will soon commence the erection of a forge shop, 50x200 feet; a polishing shop, 30x175 feet; a tempering shop, 30x60 feet; an engine room, 38x50 feet, besides a warehouse and other buildings.

The North & Judd Manufacturing Company, New Britain, Conn., have just issued a new illustrated catalogue of 100 pages. This book of illustrations has a red border and is one of the finest we have ever seen, and comprises No. 4 of the catalogues issued by the above concern. The engravings are excellent.

Oliver H. Castle & Hitchcock, Indianapolis, Ind., have rented additional buildings to increase their facilities for doing work. They are largely engaged in making experimental machinery, and are to build the dry placer ore concentrating machine. They will add new machinery, including engine and boiler.

The Duggan-Parker Hardware Manufacturing Company, St. Louis, Mo., are about to erect a finishing room, 100x30 feet; a foundry, 100x50 feet, and an annealing room, 100x30 feet. These buildings will be in addition to their present ones, and will increase their capacity about three-fold.

Fuller & Willson, machinists, Worcester, Mass., who commenced the manufacture of machinists' tools last Spring, write us that they have since then been extremely busy, with present orders ahead, but are increasing their facilities so as to fill orders with promptness.

Davidson Steam Pump Company, Brooklyn, N.Y., have orders on hand to keep them busy for six months with 100 men. They have doubled the size of their shops within the past year, and added $15,000 worth of new machinery and tools. They have under way a new building to accommodate nearly the same amount of machinery.

The Peerless Punch & Shear Co., 116 Liberty St,, New York, are making a drill press of 22 inch swing back geared and strongly braced at the base, having quick-return motion. The spindle is 46 inches long and balanced by weight in post. The machine is bolted together so as to be easily taken apart and packed in small compass.

A new company, with a capital of $100,000, has been formed for the manufacture of writing paper at Westfield, Mass., of which George L. Wright is President, J. W. Wilson, Clerk, and J. E. Taylor, Treasurer. The company is known as the Springdale Paper Company, and will at once erect a brick mill capable of turning out two tons of paper daily.

Boile, White & Co., of Chicago, are extending their already large saw-mill business in Tennessee, and have ordered a complete 50-horse power engine and boiler outfit of the Atlas Engine Works of Indianapolis. Cherry, O'Connor & Co., the well-known contractors, of Nashville, Tenn., have also placed an order with the same establishment for a 20"x48" Corliss engine.

Erwin W. Thompson, a graduate of Cornell University, who has contributed several articles to the AMERICAN MACHINIST, has returned to his Southern home, and formed a stock company at Thomasville, Ga., for the manufacture of cotton seed oil. The company will soon be incorporated with $25,000 capital, and will begin to erect a building in February. Mr. Thompson will be superintendent.

In a personal letter from Dr. D. J. MacGowan, of Shanghai, in reply to a letter on the subject regarding the erection of mills for the manufacture of cottons by the Chinese in Shanghai, we quote the following: "There seems to be a hitch in the article to be used, the Chinese cotton being a different staple from ours—short instead of long. However, they have made a tolerably fair start in woolen manufacture, and may accomplish something—but no revolution."

Hilles & Jones, Wilmington, Del., write us:

Since January, 1881, orders for our special tools for iron work have been constantly increasing. They consist of multiple drills, radial drills, vertical milling machines, and tools for boiler shops, such as combined punch and shears, patent plate binding rolls and plate planer. During 1881 we were very full of orders, and we now have orders on our books for many months to come. We consider the prospect for 1882 even better than the past year. Prices have advanced in proportion to labor and material. We have recently, by adding new tools and other facilities, increased our production about 25 per cent.

The Tanite Company, Stroudsburgh, Pa., have just issued a new catalogue, in which they say:

The Tanite Company was organized in 1868, and though not absolutely the oldest, is among the few old manufacturers in this specialty. During its 14 years' experience it has issued many circulars and catalogues, and for several years published a paper devoted to its own special industry. In 1873 it issued a 124-page catalogue. Now, with increased business and greater variety of goods, it issues an 80-page catalogue. The decreased catalogue is due to the simplification of the business, which has been reduced to a system. Makers and users know what is wanted better than they did 14 years ago. Emery wheels are of better average quality all over America, and being run on machines built for the purpose, are used with greater safety than ever. It used to cost us about $5 to sell a $4 emery wheel, as the buyer needed a ream of correspondence, many reams of printed matter, and then a visit from a first-class engineer; after which he generally returned the wheel, damaged and used up, with express charges both ways added, and a letter containing several big, big D's, saying the wheel was worthless. Now he writes that he couldn't do without $4 wheels, even if they cost $20 each. The Tanite emery wheel is not low in price, but it is high in reputation.

As the following communications appear to challenge the good faith with which awards were made at the Atlanta Exhibition, we give them place in our columns in the interest of that and kindred exhibitions.

The first, from Geo. H. Babcock, President of the Babcox & Wilcock Co., to Col. Sam Webber, one of the Judges at the Exposition, reads:

We notice in the printed list of awards at Atlanta, that a gold medal is said to have been recommended for the Plummer boiler, and nothing to us in the way of an award. As you were Chairman of the Judges in this group, will you kindly give us the reasons which have led to their conclusion? From the known working of the two boilers, we can only imagine that the gold medal was considered somewhat in the line of an offset for the $1,000 paid for the use of our boilers.

In reply to the above Col. Webber says:

In reply I have to say that the Board of Judges of Group 9 at the Atlanta Exposition, of which I had the honor to be Chairman, neither awarded nor recommended any gold medals to any one.

We were, in fact, prohibited from making any such award by the general instructions given us.

Had it been in our power to confer such distinction, it would have gone to the Babcock & Wilcox boiler and furnace, the operation of the latter on bituminous coal being as nearly perfect as possible.

Machinists' and Engineers' Supplies.

NEW YORK, Jan. 19, 1882.

The volume of trade in the supply market during the past week has been equal to the most sanguine expectations, and goods are still scarce.

Wrought Iron Pipe is a little easier, at 55 to 57 per cent. discount off list.

T. R. Almond, 84 Pearl St., Brooklyn, N. Y., has issued a new circular and price list describing new Turret Head and other new products.

S. A. Smith, 154 Lake Street, Chicago, Ill., has taken the sole agency for a new lathe chuck, which will soon be ready for the market.

The American Vise and Tool Association have advanced prices in conformity with present prices of labor and materials.

Iron and Metal Review.

Trade in the Pig Iron line has been rather quiet during the past week, but the inquiry is fair. There is some difficulty, however, in obtaining stock for immediate delivery. We quote foundry No. 1 at $26 to $27 : Foundry No. 2 X, $25 : Gray Forge, $23.50 to $24

The market for Foreign Iron is supported by high freights and a moderate supply, therefore prices continue high. We quote Gartsherrie at $26.50 to $27 ; Coltness, $27.50 ; Glengarnock, $25.50 to $26 ; Carnbroe, $25 ; Eglinton, $25 ; Summerlee, $26.50.

Steel, Iron and Old Rails unchanged. Prime Wrought Iron Scrap in demand at $32 to $32.50. Merchants' Bar Iron is very firm, and higher prices are looked for.

The demand for copper is light but steady, at 20½c. for Lake Superior. Banca Tin, 26c. to 26½c.; Straits and Australian, 25½c. Lead, 5c. Spelter, Western, 5¾c. to 6c. Antimony 14½c. for Cookson's, and 13¼c. for Hallett's brand.

WANTED

"Situation and Help" Advertisements, 30 cents a line, each insertion. About seven words make a line. Should be received Thursday morning.

Wanted—A first-class mechanical draughtsman. Enquire, S. R. Krom, 153 Cedar Street, New York.

Mechanical Draughtsman desires re-engagement. Address, BOX 2, AMERICAN MACHINIST, Office.

Wanted—By an experienced and first-class mechanic, a situation as foreman of iron foundry. Competent in all branches. Address Ability, AMERICAN MACHINIST office.

Wanted—Foreman to take charge of spoke lathes. None but men of experience, that can furnish the best of references as to capacity and sobriety, need apply. Chester & Harris Manufacturing Co., St. Louis, Mo.

Wanted—An experienced working machinist, competent to take charge of and keep in order all the machinery connected with our works. A permanent situation, with fair wages, to the right man. Apply to Chemung Hollow Ware Works, State Reformatory, Elmira, N. Y.

Situation, as manager or traveling salesman in some mechanical business. Is a thorough machinist. Has had a good experience in the management of men and in general office work, bookkeeping and the general correspondence. Best of reference given. Address "Herbert," care of W. J. Leonard, at Smith & Wesson's, Springfield, Mass.

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LATHES,
24" x 20'.
PLANERS,
26" x 24" x 8'.
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PATENT SOLICITOR & EXPERT,
No. 23 Murray St., New York.

Lodge, Barker & Co.
S. E. Cor. Pearl and Plum Sts.
CINCINNATI, O.
Manufacturers of
AND SMALL TURRET LATHES.
18" ENGINE LATHES

JUST PUBLISHED. PRICE, $1.40. MAIL FREE.
A TREATISE ON
IRON FOUNDING,
By CLAUDE WYLIE,
Practical Iron Moulder.
Written for practical men in both large and small foundries.
E. & F. N. SPON, 446 Broome Street, N. Y.

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BRADLEY & COMPANY SYRACUSE, N.Y.

MACHINERY FOR REDUCING AND POINTING WIRE
by compression or swaging COLD. Machines manufactured under patents owned by Miller, Metcalf & Parkin, Pittsburgh, Pa. For machines or information, address
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FOR ALL KINDS OF FUEL.
SEND FOR CIRCULAR.
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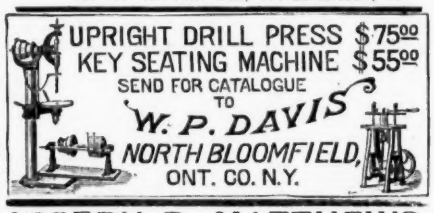
709 MARKET STREET, ST. LOUIS,
130 W. SECOND ST., CINCINNATI, O.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KEY SEATING MACHINE $55.00
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Manufacturer of the MATTHEWS
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For Electric Lights and other purposes requiring steady, reliable power. The best and cheapest in the market. 25 H. P. for $500. Also, manufacturer of the Matthews PATENT PLANING MACHINE.

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Universal Wood Workers, Planing, Matching, Moulding, Band and Scroll Sawing Machines, Carriage, Wagon and Wheel Machinery, etc.
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For Stationary, Marine and other Boilers.
SIMPLEST AND BEST MADE.
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511 & 513 North 12th Street, Philada.
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VALVES—Double and Single Gate, 1-2 in. to 48 in. outside and inside Screws, Indicator, etc., for Gas, Water and Steam.
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THE
Greenfield Vertical Engine,
SOLD BY
COOKE & CO., FORMERLY COOKE & BEGGS,
Dealers in MACHINERY AND SUPPLIES,
6 Cortlandt Street, New York,

IS THE BEST IN THE MARKET.
Send for our prices before ordering Engines, Boilers, or other machinery.
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Etc.

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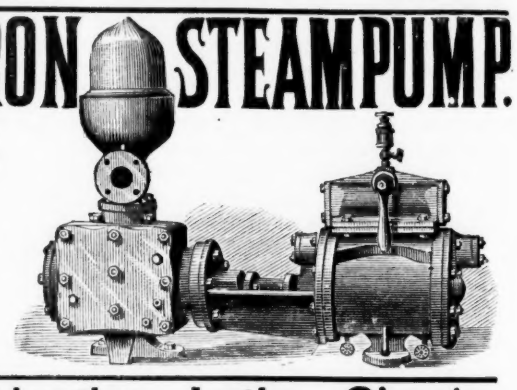
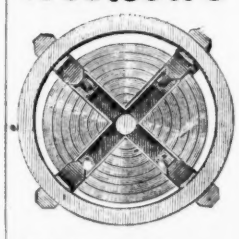
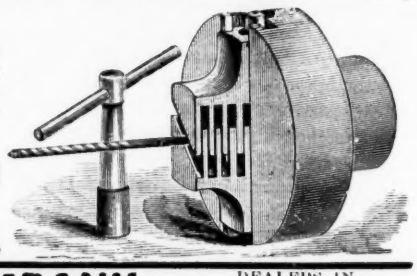
Is the Standard of Excellence
AT HOME AND ABROAD.
THE A. S. CAMERON
STEAM PUMP WORKS,
Foot of East 23d Street, New York.


Westcott's Combination Lathe Chucks,
Both Scroll and Geared.

Greater capacity. Jaws reversible. No projecting screws in the rim. Movements independent, universal and eccentric.

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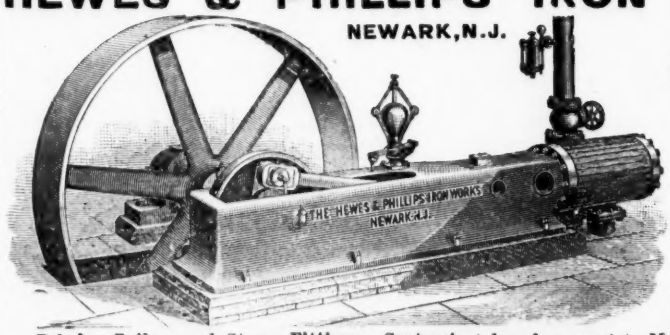
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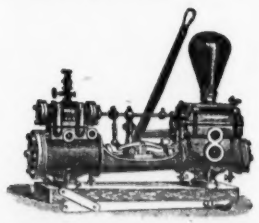
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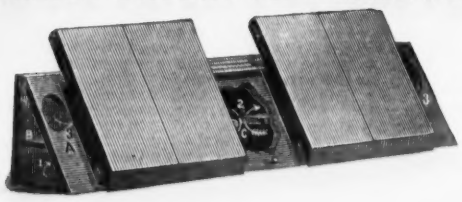
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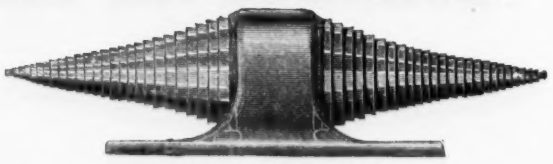
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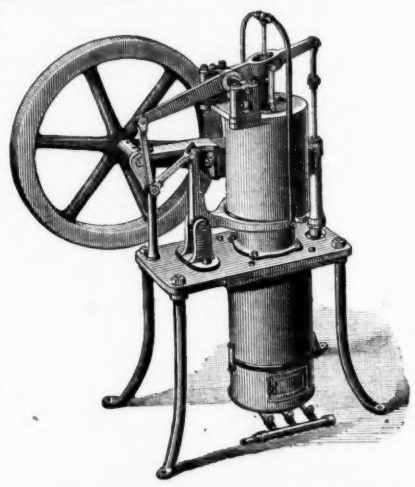

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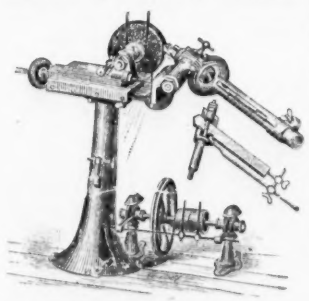

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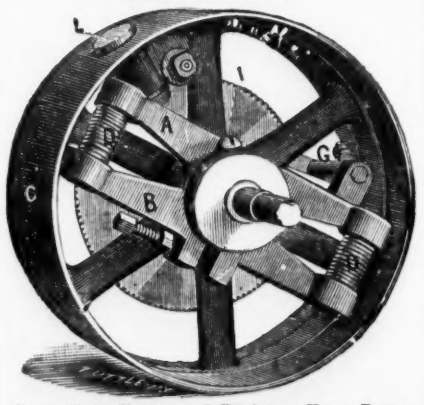

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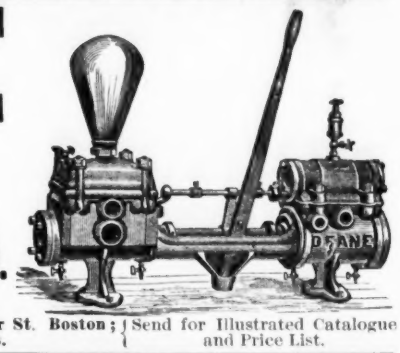

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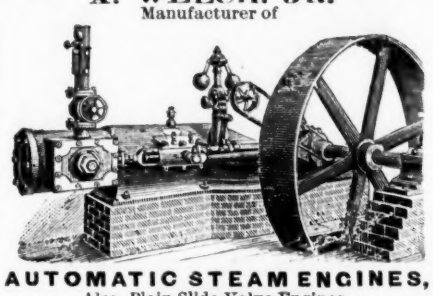

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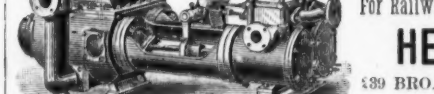

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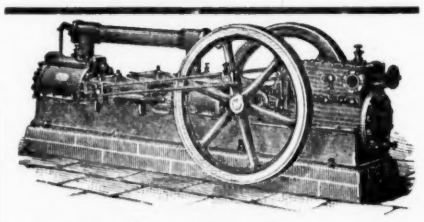

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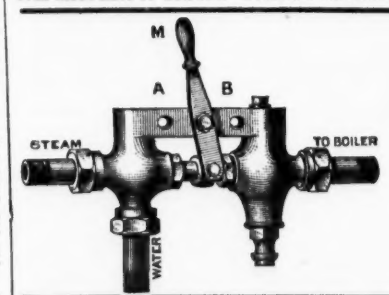

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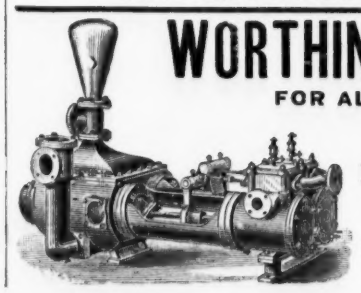

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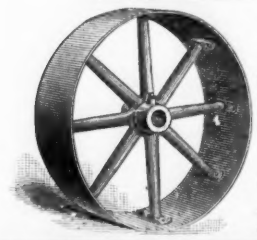

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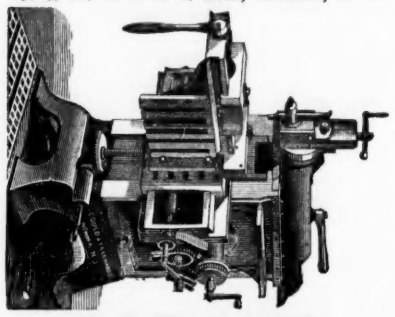

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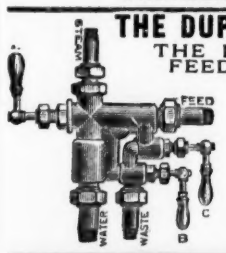

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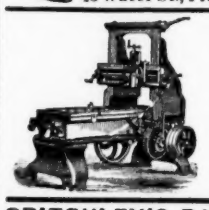

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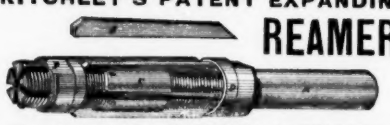

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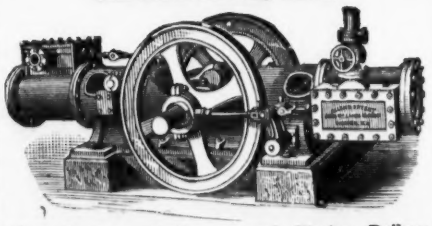

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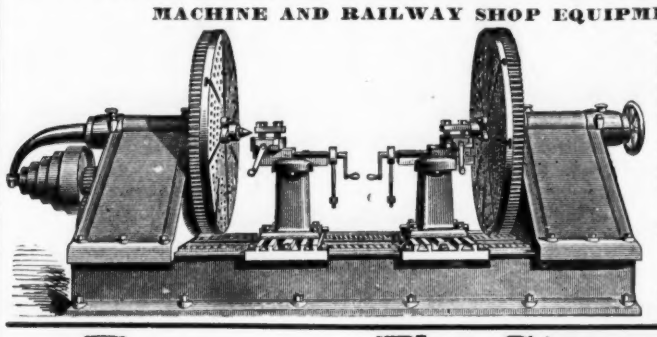

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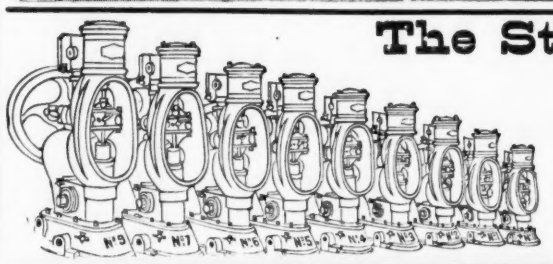

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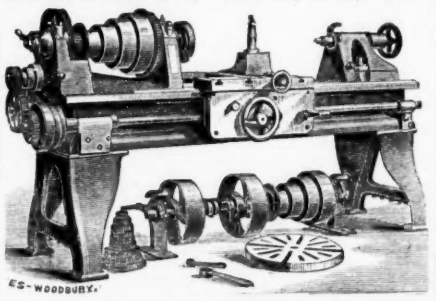

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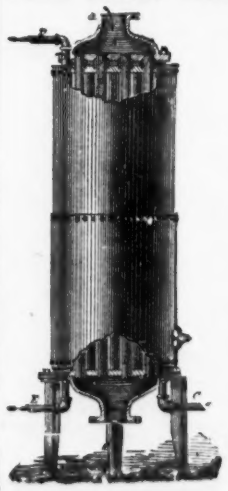

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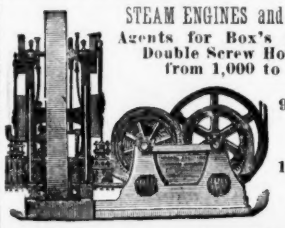

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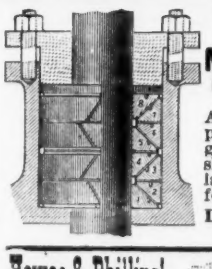

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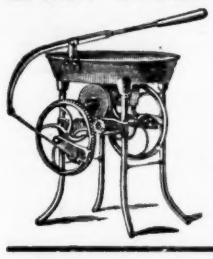

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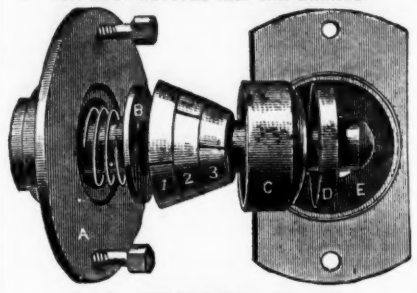

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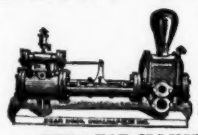

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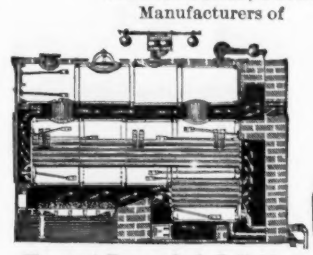

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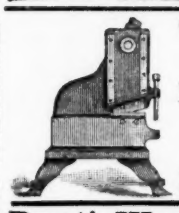

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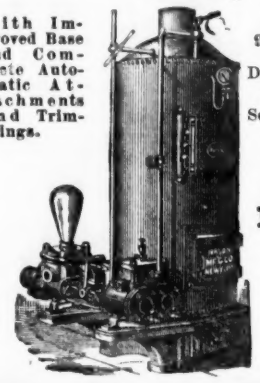

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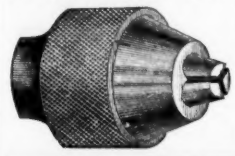

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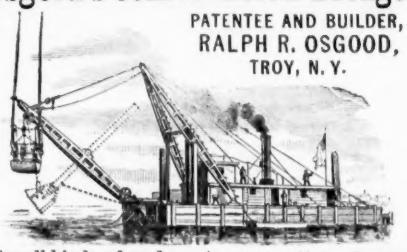

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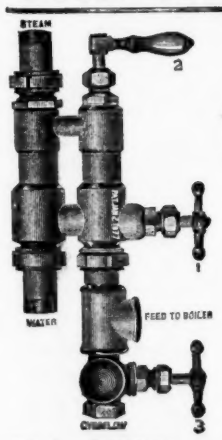

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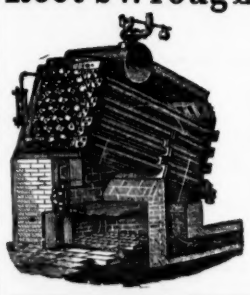

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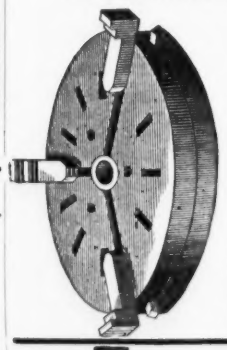

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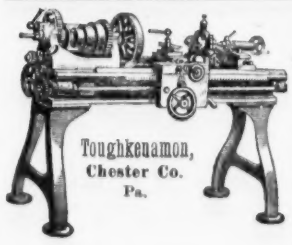

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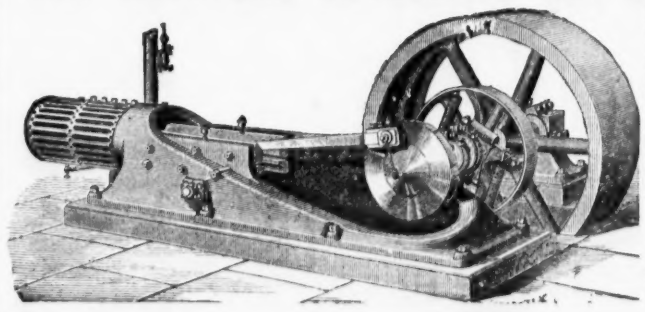

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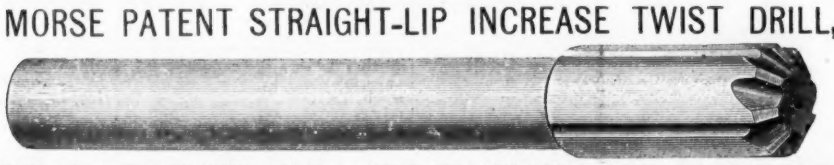

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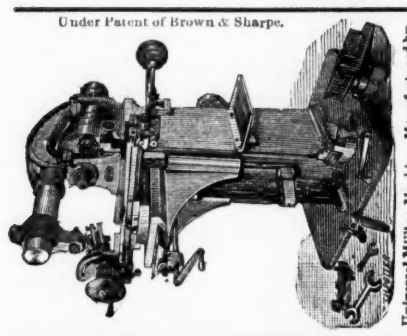

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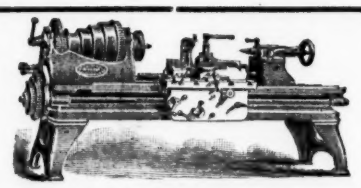

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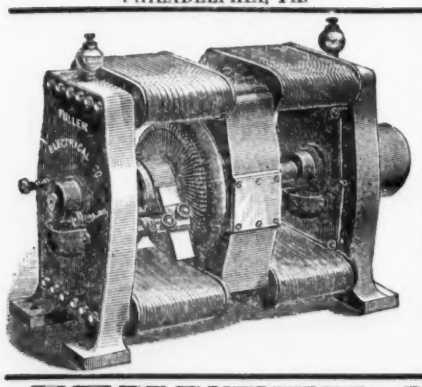

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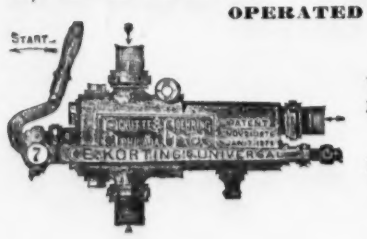

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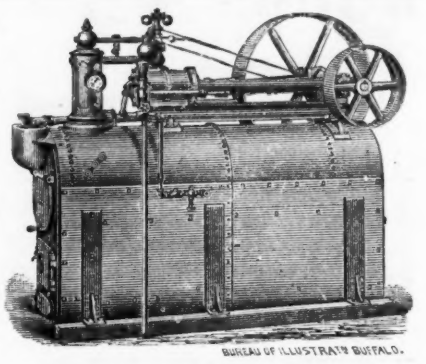

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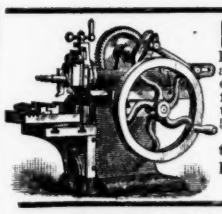

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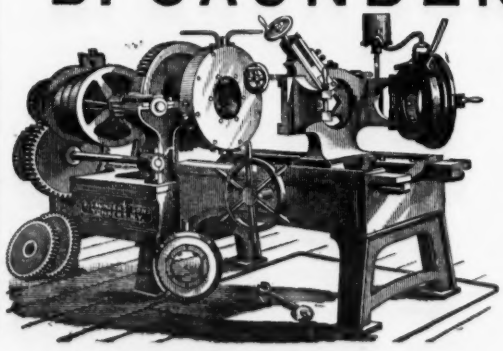

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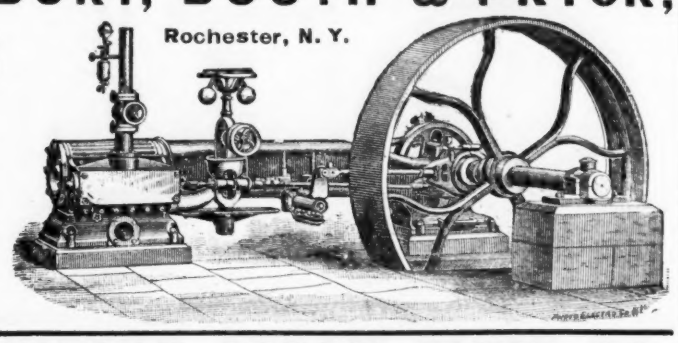

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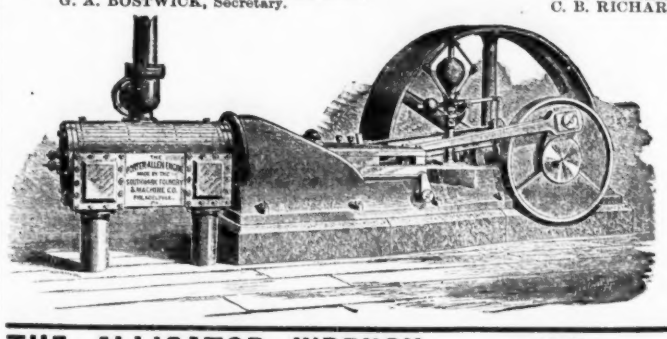

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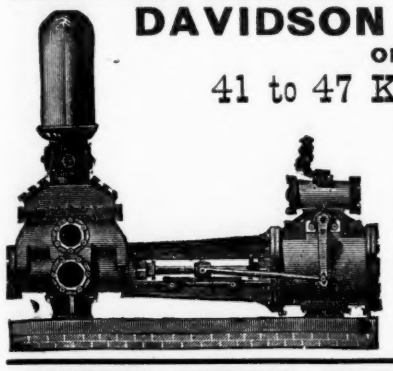

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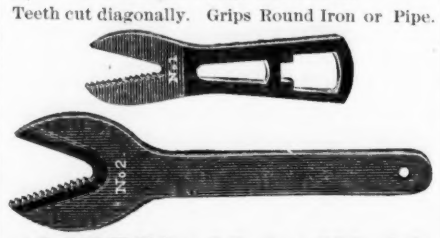

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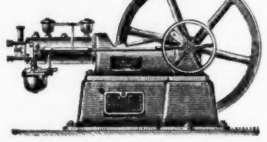

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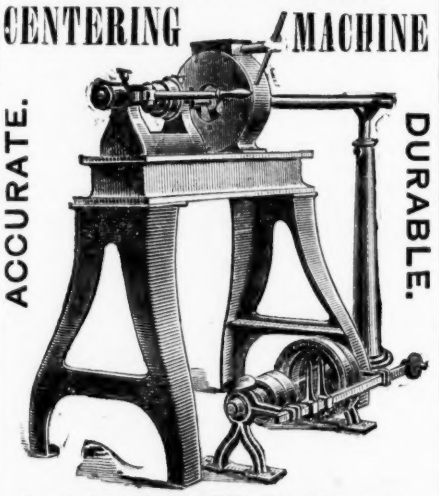

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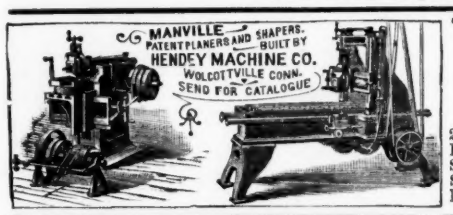

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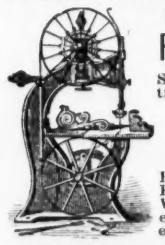

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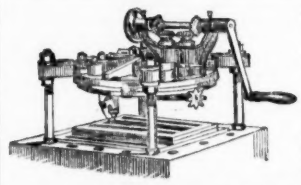

Patent Portable Valve Seat Rotary Planing Machine.

Descriptive Circular on application

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New Descriptive Circular on application.

Pattern and Brand Letters.

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JANUARY 18, 1882.

One Car Axle Lathe. Hewes & Phillips. New.
One Hor. Boring Lathe, 52 in. x 13 ft. L. W. Pond. In good order.
One Engine Lathe, 36 in. x 15½ ft. A1 order.
One " " 30 in. x 15½ ft. New Haven.
One " " 28 in. x 16 ft. Fifield. New.
One " " 28 in. x 12 ft. " "
One " " 24 in. x 12 ft. Ames. New.
One " " 24 in. x 10 ft. New Haven.
One " " 20 in. x 14 ft. Fifield. New.
One " " 20 in. x 10 ft. Pond. A1.
One " " 20 in. x 12 ft. Ames. New.
One " " 20 in. x 10 ft. " "
One " " 20 in. x 8 ft. " New.
One " " 18 in. x 9 ft. White'b. Good order.
One " " 18 in. x 10 ft. Jones & Lamson, New. 1⅛ in. Hole in Spindle.
Three Engine Lathes 18 in. x 8 ft. Jones & Lamson New.
One Engine Lathe, 18 in. x 8 ft. Lathe & Morse. Good order.
One Engine Lathe, 16 in. x 6-7-8 ft. Bridgeport Mch. Tool Works. New.
Six Engine Lathes, 16 in. x 6 ft.-7ft. x 8 ft. Ames. New.
One " " 15 in. x 6 ft. Flather's. New.
Three " " 14 in. x 6 ft. Star Tool Co. New.
One " " 14 in. x 6 ft. Hand. New.
One " " 13 in. x 6 ft. Ames. New.
One " " 13 ft. x 4½ ft.
One " " 12 in. x 6 ft.
Two " " 11 in. x 5 ft.
One Hand Lathe. 11 in. x 4½ ft. New Spencer.
One " " 12. in x 5 ft.. Hendey. New.
Two " " 7 in. x 2½ ft. New Spencer.
One Planer 18 in. x 3½ ft. Good order.
One " 24 in. x 7 ft. New Haven. Good order.
One " 30 in. x 12 ft. Harrington. New.
One 6 in. Stroke Shaper. Boynton. New.
One 15 inch Stroke Shaper. Gould & Eberhardt. New.
One 16 in. Upright Drill. Prentice. New.
Two 20 in. " " Prentiss. New.
One 24 in. " " Ames. New.
One 38 in. " " New Haven. New.
One Suspension Drill. Kidd. Good order.
Three Sensitive Drills.
One Lincoln Miller. Pratt & Whitney. No. 2.
40 Lincoln Millers and Vises. Good order.
One No. 3 Garvin Hand Miller. New.
One 15 lb. Air Hammer. Hotchkiss. Good order.
One 1000 lb. Steam Hammer. Sweet.
One 10 in. x 30 in. Dudgeon Steam Hammer.
One 250 lb. Steam Hammer. Ferris & Miles.
One 200 lb. Bradley Hammer. A1.

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NEW MACHINE SHOP TOOLS.

List of Sizes for Quick Delivery.

Screw Cutting Engine Lathes						Iron Planers.	
20 in.	swing,	8 ft.	bed.	Wight & Powell.		22 in. x 20 in. x 4 ft.	Wheeler.
20 "	"	12 "	"	"	"	24 in. x 24 in. x 6 ft.	Hendey.
20 "	"	12 "	"	Ames.		24 in. x 24 in. x 6 ft.	Whitcomb.
20 "	"	10 "	"	Flather.		26 in. x 24 in. x 6 ft.	Gleason.
21 "	"	10 "	"	Blaisdell.		26 in. x 24 in. x 7 ft.	"
21 "	"	12 "	"	"		24 in. x 24 in. x 8 ft.	Ames.
21 "	"	14 "	"	"		26 in. x 26 in. x 8 ft.	Pond.
22 "	"	16 "	"	Ames.		27 in. x 27 in. x 8 ft.	Whitcomb.
24 "	"	12 "	"	"		28 in. x 28 in. x 6 ft.	Gleason.
24 "	"	16 "	"	Blaisdell.		28 in. x 28 in. x 8 ft.	"
26 "	"	16 "	"	Niles.		30 in. x 30 in. x 8 ft.	Whitcomb.
30 "	"	15 "	"	Ames.		30 in. x 30 in. x 8 ft.	Harrington.
30 "	"	23 "	"	"		36 in. x 36 in. x 12 ft.	Gleason.
32 "	"	26 "	"	Gleason.		42 in. x 42 in. x 16 ft.	"

Second-Hand and New Machinery.

January 19, 1882.

The following New and Improved Machinists Tools are part of what we have for early delivery:

2 30 in. x 30 in. x 8 ft. Planers. New. Manch.
2 30 in. swing, 15 ft. bed. Engine Lathes. February.
1 22 in. swing, 13½ ft. Bed Engine Lathes. January
3 18 in. " 10 ft. " " "
3 18 in. " 8 ft. " " "
2 15 in. " 6 ft. " " "
2 30 in. " Upright Back Geared Drills. February

The following in store:

2 22 in. swing, 12 ft, Bed Engine Lathe. New.
1 19 in. " 6 ft, " " 2d-hand.
2 18 in. " 10 ft. " " New.
2 18 in. " 8 ft. " " "
2 16 in. " 6 ft. " " "
2 16 in. " 7 ft. " " "
1 17 in. " 6 ft. " " 2d-hand.
1 17 in. " 7½ ft. " " "
1 15 in. " 5 ft. " " "
1 12 in. " 4 ft. " " "
1 21 in. " 10 ft. Bed Turret Head Lathe.
7 15 in. " 9 ft. Hand Lathe. New.
1 15 in. " 5 ft. Bed Hand Lathe. 2d-hand.
3 12 in. " 6 ft. " " New.
1 10 in. " 4½ ft. " " "
1 38 in. swing Pulley Lathe, new.
1 Round Arbor Fox Lathe.
1 26 in. x 26 in. x 6 ft. Planer. New.
1 15 in. Hendey Shaper. New.
2 48 in. Swing Radial Drills. New.
2 20 in. Upright Drills. Back Gear. New.
1 21 in. Upright Drill. Nearly New.
1 24 in. Harris Upright Drill. Second-hand.
2 Wall Drills, heavy. Second-hand. 60 and 72 in
1 3 Spindle Drill. New.
1 Pratt & Whitney Cam Cutter, 2 heads. Fine.
2 Milling Machines, Lincoln pattern. Second-hand
2 Manhattan Arms Co. Millers. Second-hand.
1 Sellers Milling Machine. 2d-hand.
1 Face Milling Machine. Second-hand.
1 Pond's Double Milling Machine. 2d-hand.
1 No. 2 Screw Machine. New.
1 Screw Head Slotter. Second-hand.
3 Second-hand Profiling Machines.
1 Vertical Centering Machine. Nearly new.
3 4½ in. Horizontal Centering Machines. New.
3 Emery Grinders, 2d-hand.
1 Sellers' Tool Grinder. "
1 Pipe Cutting Machine. Second Hand. 2 in.
1 Bolt Cutter, 1½ in. New. With Taps and Dies
1 Bolt Pointing Machine. Second-hand.
1 Double Nut Tapper. New.
3 Pulley Forcing Machines. Second-hand.
1 Horizontal Boring Bar, 12¾ in. diam. " "
1 " " Machine, Small. 2d-hand.
1 " " " 4 spindle "
1 Betts, No. 2, Power Punch. New.
4 Double-Acting Presses, No. 3, nearly new.
4 Single-Acting Presses, for power, "
100 Foot Presses, nearly new.
1 Medium Power Punching Press. Second hand.
2 Small " " Presses. "
1 Foot Punch, with bench. New.
1 Lot Pistol Machinery. Second-hand.
1 Grind Stone and Frame.
1 Crane. Second-hand. 20 ft. jib. 6 Tons.
1 4 Side Moulding Machine. New.
Lot of Forges, 1 Jig Saw, 1 Double Saw Bench, 1 Band Saw, 1 Slat Tenoner, 1 Railway Saw Bench, 1 foot-power Circular Saw.
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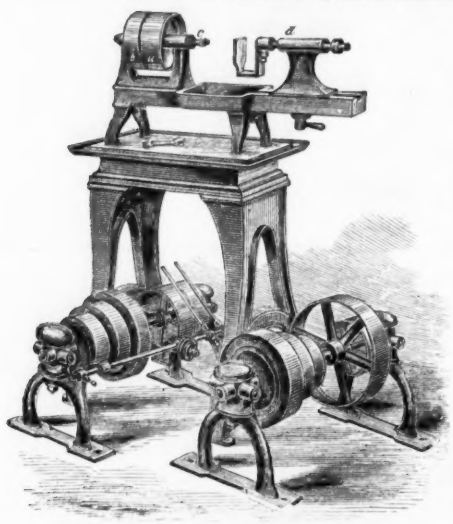

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This machine is self-reversing by slightly pressing the piece to be operated upon against the end of the tap, and drawing it in the opposite direction when the work is done.

The over-head work consists of two pairs of adjustable hangers, with two counter-shafts, cones to vary speed, tight and loose pulley, two pulleys to drive machine, an iron shipper-rod with belt guides, shipper-dog and stops. The tight and loose pulleys on counter-shaft are 10 inches diameter and 2½ inches wide. Counter-shaft should run 260 turns per minute. Weight of machine, with over head work, about 500 pounds. Price, with everything shown in cut, boxed and delivered at Railroad or Steamer, in Providence, $110.

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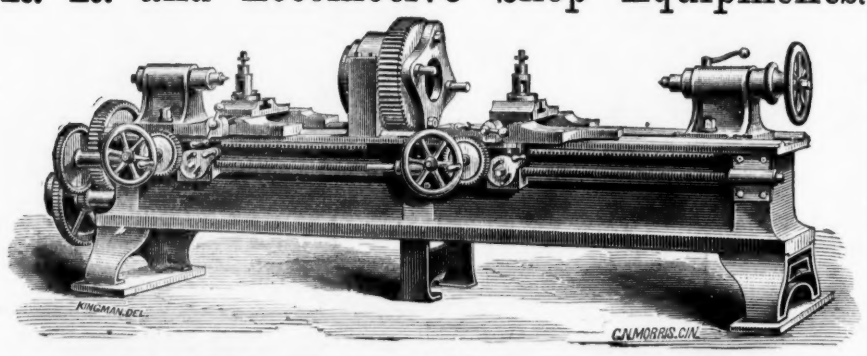

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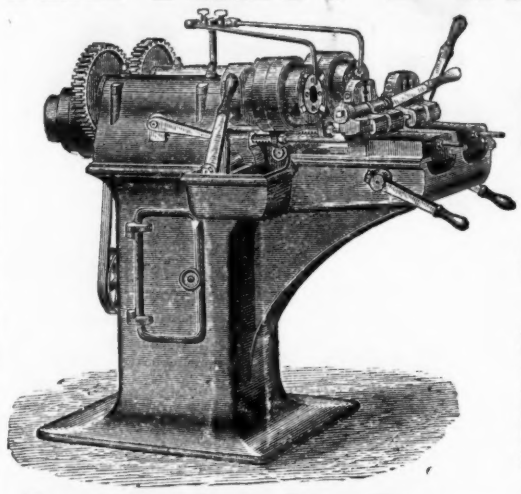

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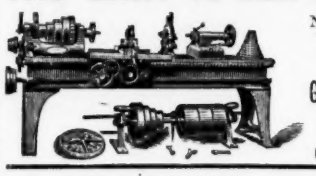

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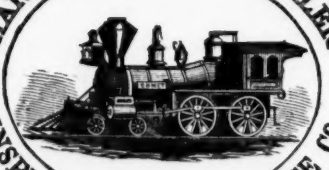

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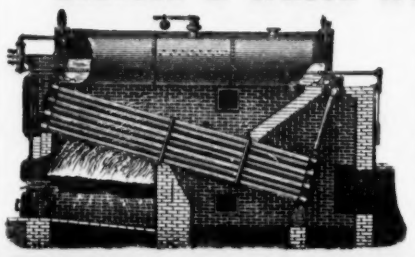

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